

ENSONIQ

TSV12

Performance/Composition Synthesizer

Musician's Manual

Version 3.0

TS-12 Musician's Manual:

Written, Designed,
and Illustrated by:

Tom Tracy, Bill Whipple

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ENSONIQ® Corp
155 Great Valley Parkway
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USA

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Please record the following information:

Your Authorized ENSONIQ Dealer: _____ Phone: _____

Your Dealer Sales Representative: _____

Serial Number of Unit: _____ Date of Purchase: _____

Your Authorized ENSONIQ Dealer is your primary source for service and support. The above information will be helpful in communicating with your Authorized ENSONIQ Dealer, and provide necessary information should you need to contact ENSONIQ Customer Service. If you have any questions concerning the use of this unit, please contact your Authorized ENSONIQ Dealer first. For additional technical support, or to find the name of the nearest Authorized ENSONIQ Repair Station, call ENSONIQ Customer Service at (610) 647-3930 Monday through Friday 9:30 AM to 12:15 PM and 1:15 PM to 6:30 PM Eastern Time. Between 1:15 PM and 5:00 PM we experience our heaviest call load. During these times, there may be delays in answering your call.

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IMPORTANT:

"This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been designed to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures."

- * reorient the receiving antenna
- * relocate the instrument with respect to the receiver
- * move the instrument away from the receiver
- * plug the instrument into a different outlet so that the instrument and receiver are on different branch circuits

"If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: 'How to Identify and Resolve Radio-TV Interference Problems.' This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402 Stock No. 004-000-00345-4."

In order to fulfill warranty requirements the TS-12 should be serviced only by an Authorized ENSONIQ Repair Station.

The ENSONIQ serial number label must appear on the outside of the Unit or the ENSONIQ warranty is void.

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Welcome!

Congratulations, and thank-you for your purchase of the ENSONIQ TS-12 Performance/Composition Synthesizer. The TS-12 offers the most complete set of features for the performing and recording musician ever offered. From the great feeling 76-note weighted-action keyboard to the great sounding 300 Programs and 300 Performance Presets, you'll find the TS-12 a wonderful instrument to play. The intuitive and musical sequencer design in the TS-12 will help you go from initial inspiration to a completely mixed song without getting in your way.

To expand your sound palette the TS-12 comes with 2 Megabytes of Sample RAM, expandable to 8 Megabytes with industry-standard SIMMs. This RAM can be used to load in any Sample Sounds created for ENSONIQ's EPS/EPS-16 PLUS, and ASR-10 samplers, giving you access to the largest library of sampled sounds anywhere! And with the SP-4 SCSI kit option installed, you can read Sampled Sound files stored on CD-ROM libraries and other SCSI devices. In addition to having access to this versatile library of sounds (from ENSONIQ and many third-party companies from around the world), you can incorporate vocals, drum loops, and any sound imaginable into your music. Just use an ENSONIQ sampler, or your friend's ENSONIQ sampler, to make new sounds to use in your music. No expandable waveform synthesizer offers you this much versatility at such an affordable price.

The Sounds

The sound of the TS-12 is based on 254 waveforms encompassing all the possible instrument groups; acoustic, electric, digital and analog synthesis, sound effects and more. The acoustic instrument waves have been carefully crafted from ENSONIQ's huge library of source recordings, including many sounds from our ground-breaking Signature Series. For the more imaginative possibilities the unique TransWaves™ give you the moving, dynamic sound of swept wavetables. The new Hyper-Wave™ voice architecture breaks open new sonic ground with the ability to create wave-lists that can sound like evocative, ever-changing pads to "jam-loop" drum and percussive grooves that can change pitch without ever changing tempo.

Each Program in the TS-12 is actually six independent sound sources each with their own parameters and programming. Now you can combine sampled sounds with analog synthetic sounds, and exotic digital textures at the push of a button -- no MIDI cables needed! And with 32-note polyphony you can layer sounds or sequence freely, without worrying about losing voices while you play.

Up to three sounds can be combined into a preset, which contains its own effects set-up and special performance parameters. Presets can be thought of as handy "performance memories" which allow you to create and save sound combinations, splits, layers, patch select variations, etc.

The TS-12's 24-bit dynamic effects are incorporated as an integral component of each sound, and any effects parameter can be modulated by any of 13 modulation sources. Programs of similar types can be selected using ENSONIQ's SoundFinder feature, and the TS-12 has Patch Select buttons, giving you expressive control over your sounds and unparalleled flexibility as a MIDI controller.

The Sequencer

To capture and expand on a creative idea, the TS-12 has an over 30,000 note, 24-track sequencer with extensive editing control. And with the addition of the optional SQX-70, the TS-12 can have over 97,000 notes of sequencer memory. Record in real-time or step entry, looped or linear mode, even transfer sequences from external MIDI devices with Multi-Track record. Sequence internal and/or external sound sources with a clock resolution of 96 PPQ for accurate timing resolution.

A variety of editing options gives you control over your sequenced parts: scale volume or controllers, edit specific notes or events, transpose, quantize, shift clocks, and more. Edits can be performed over ranges that can be specified by bar, beat, clock and/or note range for utmost accuracy, and every edit can be auditioned against the original part so you can decide which one to keep. During mixdown you can pan sounds in stereo to any of four individual outputs. MIDI Automated Mixdown remembers all volume and panning information, and the TS-12's disk drive allows you to store your sounds, sequence data, even MIDI Sys-Ex data on inexpensive floppy disks.

MIDI Control

As a MIDI controller the TS-12 can use Song/Sequence "headers" to become a 24-zone controller with different MIDI channels, status, key zones, volume, transposition, and other performance parameters defined for each region. Stacking sounds is as easy as "double-clicking" a button, and the large display on the TS-12 gives you information in a clear, uncrowded layout.

The power of a complete MIDI production facility coupled with the benefits of a single integrated keyboard environment. It's the latest refinement from the company that pioneered the concept of the synthesizer-based workstation. The TS-12 Performance/Composition Synthesizer... from ENSONIQ.

Clean Up and Maintenance

Only clean the exterior of your TS-12 with a soft, lint-free, dry (or slightly damp) cloth. You can use a slightly dampened cloth (with a mild neutral detergent) to remove stubborn dirt, but make sure that the TS-12 is thoroughly dry before turning on the power. Never use alcohol, benzene, volatile cleaners, solvents, abrasives, polish or rubbing compounds.

Center Supported Stands

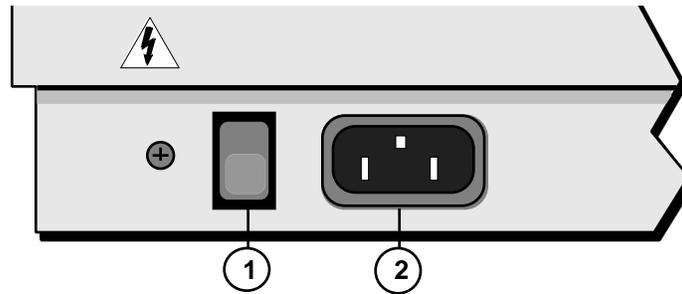
With the TS-12, or any weighted-action keyboard, we highly recommend that you do not use center-supported column-type keyboard stands. Weighted keyboards are too heavy, too long, and usually require greater playing force to be exerted on them. They will be unstable on center-supported column-type stands.

The Manual

This manual is your guide to unlocking the full power of the TS-12. At this point, you're probably anxious to plug your TS-12 in and get playing. After the initial "I just gotta hear it" phase has passed and you're ready to utilize the full potential of the TS-12, please take the time to read the sections on programming, sequencing, and storage. They'll provide valuable information and tips, as well as speed up the learning process and enjoyment of the instrument.

Thank you again for choosing ENSONIQ. Enjoy the music!

Power



Insert the line cord into the line receptacle on the back of the TS-12 (2), next to the power switch (1). Plug the other end of the cable into a grounded AC outlet. The proper voltage for your TS-12 is listed on the Serial Number label on the rear panel. Turn the TS-12 power on and make sure the display lights up. If not, check your connections and power source. The first thing the TS-12 does when it starts up is calibrate the keyboard. Be sure not to touch the keyboard while the display reads CALIBRATING KEYBOARD - DO NOT TOUCH.

Note: Because the TS-12 can automatically load Sampled Sounds previously loaded from a connected SCSI Storage Device, we recommend powering on the SCSI Storage Device(s) first before powering on the TS-12.

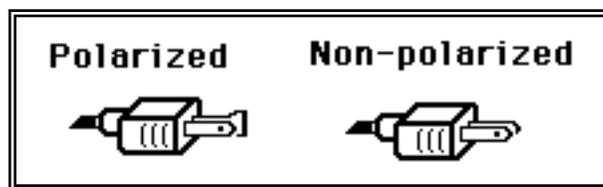
Power — Polarization and Grounding

Like many modern electrical devices, your ENSONIQ product has a three-prong power cord with earth ground to ensure safe operation. Some products have power cords with only two prongs and no earth ground. To ensure safe operation, modern products with two-prong power cords have polarized plugs which can only be inserted into an outlet the proper way.

Some products, such as older guitar amplifiers, do not have polarized plugs and can be connected to an outlet incorrectly. This may result in dangerous high voltages on the audio connections that could cause you physical harm or damage any properly grounded equipment to which they are connected, such as your ENSONIQ product.

To avoid shock hazards or equipment damage, we recommend the following precautions:

- If you own equipment with two pronged power cords, check to see if they are polarized or non-polarized. You might consider having an authorized repair station change any non-polarized plugs on your equipment to polarized plugs to avoid future problems.



- Exercise caution when using extension cords or plug adapters. Proper polarization should always be maintained from the outlet to the plug. The use of polarized extension cords and adapters is the easiest way to maintain proper polarity.
- Whenever possible, connect all products with grounded power cords to the same outlet ground. This will ensure a common ground level to prevent equipment damage and minimize hum in the audio output.

AC outlet testers are available from many electronic supply and hardware stores. These can be used to check for proper polarity of outlets and cords.

Ground Loops

Sometimes currents flowing through the ground line generate a signal seen by another part of the circuit sharing the same ground. In other words, if there are two identical signal paths within a circuit, they can form a loop which can result in hum and/or noise. If you are using equipment that has 3-prong "grounded" AC power cords, you may suffer from a ground loop resulting from the interconnection of this equipment. The following diagram shows how cascading or "chaining" the output of one 3-prong grounded system into the input of another 3-prong grounded system with a standard unbalanced 2 conductor cord (like a 1/4" guitar cable) can result in a ground loop.

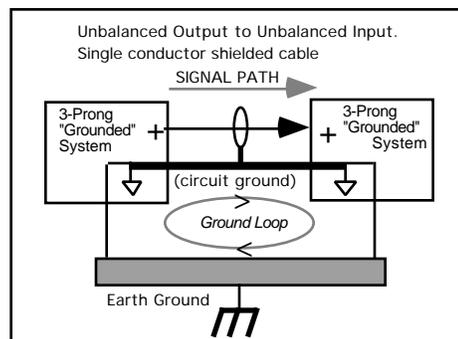


FIG. 1

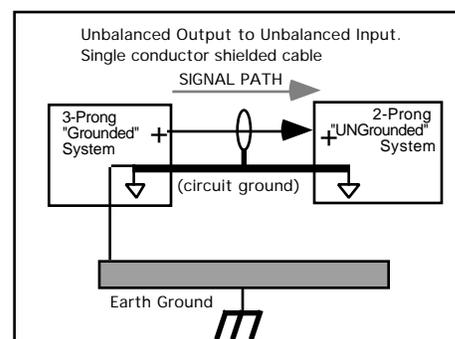


FIG. 2

Fig. 1 depicts a system interconnection where a ground loop can exist. Fig. 2 depicts a system interconnection where a ground loop does NOT exist. When interconnecting 3-prong grounded systems, you can use signal isolation transformers to prevent ground loops. This coupling transformer effectively isolates two interconnected system signal grounds, while still allowing the signal to pass through.

AC Line Conditioning

As with any computer device, the TS-12 is sensitive to sharp peaks and drops in the AC line voltage. Lightning strikes, power drops or sudden and erratic surges in the AC line voltage can scramble the internal memory and, in some cases, damage the unit's hardware. Here are a few suggestions to help guard against such occurrences:

- A Surge/Spikes Suppressor. The cheaper of the options, a surge/spike suppressor absorbs surges and protects your gear from all but the most severe over-voltage conditions. You can get multi-outlet power strips with built-in surge/spike suppressors for little more than the cost of unprotected power strips, so using one is a good investment for all your electronic equipment.
- A Line Conditioner. This is the best, but by far the more expensive, way to protect your gear. In addition to protecting against surges and spikes, a line conditioner guards the equipment against excessively high or low line voltages. If you use the TS-12 in lots of different locations with varying or unknown AC line conditions, you might consider investing in a line conditioner.

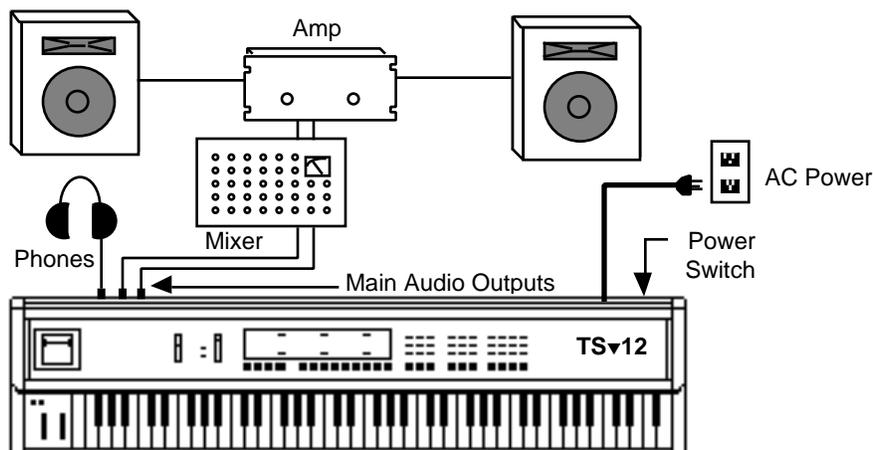
Temperature Guidelines

The inner workings of the TS-12 contain a substantial amount of computerized and electronic circuitry that can be susceptible to damage when exposed to extreme temperature changes. When the TS-12 is brought inside after sitting in a cold climate (i.e. the back seat of your car), condensation builds up on the internal circuitry in much the same way a pair of glasses fogs up when you come inside on a cold day. If the unit is powered up as this condensation occurs, components can short out or be damaged. Excessively high temperatures also pose a threat to the unit, stressing both the internal circuits as well as the case. With this in mind, it is highly advisable to follow these precautions when storing and setting up your TS-12:

- Avoid leaving the TS-12 in temperatures of less than 50 degrees Fahrenheit or more than 100 degrees Fahrenheit.
- When bringing the TS-12 indoors after travel, allow the unit at least twenty minutes to reach room temperature before powering up. In the case of excessive outdoor temperatures (below 50 degrees Fahrenheit or above 100 degrees Fahrenheit), allow an hour or more before power up.
- Avoid leaving the TS-12 inside a vehicle exposed to direct sunlight.

Amplification

Connect the Main Audio Outputs of the TS-12 to the line level inputs of a mixer, instrument amplifier, stereo, or any other sound system, using 1/4 inch audio cables. For an additional set of dry outputs, connect the AUX Outputs to two more mixer channels. If your system is stereo, connect the Left and Right Main Outputs to two channels of your mixer, stereo, etc. If it's mono, use either of the Audio Outputs, but make sure nothing is plugged into the other output. For listening through headphones, plug the phones into the rear-panel jack marked Phones. If you're running the TS-12 through a mixer, in stereo, be sure to pan the left mixer input fully left, and the right input fully right.



It is a good idea to make sure your audio system is turned off (or down) when making connections, to avoid damaging speakers or other components.

Be Careful!

The TS-12 outputs are line-level, and are intended to be connected only to line-level inputs, such as those on a mixer, stereo pre-amp, keyboard amp, etc. Connecting the TS-12 audio outputs to a mic-level input, such as a guitar amp or the microphone jacks on a tape deck, is not recommended, and might result in damage to the device input.

Move the **Volume Slider** all the way up. As with any digital musical instrument, the TS-12 will give the best results if you keep the volume slider full on, and use the volume control on your mixer or amp to adjust its level.

Switch the audio system on, and adjust the amplifier volume for normal listening levels. If you hear no sound while playing the keyboard, switch the audio system off and check your connections.

Amplifying Your TS-12 Through a Home Stereo System

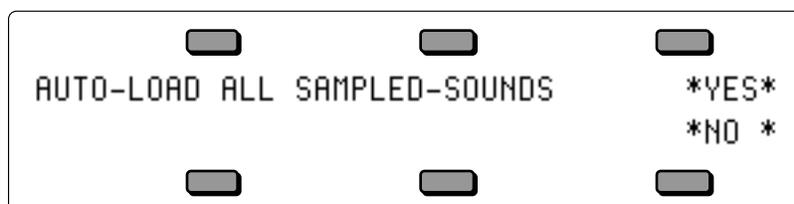
If you are thinking about amplifying your TS-12 through your home stereo, a word of caution. A home stereo is great for playing CDs, albums, tapes — the dynamic range of these media is limited, and your speakers aren't usually subjected to extreme volume changes and frequency transients. While the dynamic range of CDs is significantly greater than albums or tapes, the output of a CD player is still conservative compared to the uncompressed, unlimited line-level output of a pro-level keyboard. Running your TS-12, or any pro-level keyboard through a home stereo at high volume levels can damage your speakers, not to mention the impedance mismatch this can create. If your only means of amplification is your home stereo, then try to keep your levels on the conservative side.

Powering Up Your TS-12 In a MIDI Configuration

Just as you would power up the individual components before turning on the amplifier in your home stereo system, you should first turn on the MIDI data transmitting source (keyboards, modules, etc.) before you power up the receiving MIDI source. This will prevent any unwanted MIDI information from being "spit" out of the transmitting source during power up, which could confuse the MIDI receivers, thereby disabling them. If this should occur, turn off the receiving module, and then turn it back on.

About the Auto-Load Feature

The Auto-Load feature allows you to automatically load Sampled Sounds back into the same Bank location(s). If you have loaded any Sampled Sounds or Sample Edits into the TS-12 and then powered down, the display shows the following prompt:



If you answer ***NO *** to the Auto-Load prompt, the TS-12 will display the last Sounds or Preset Bank page, and no Sampled Sounds will be automatically loaded.

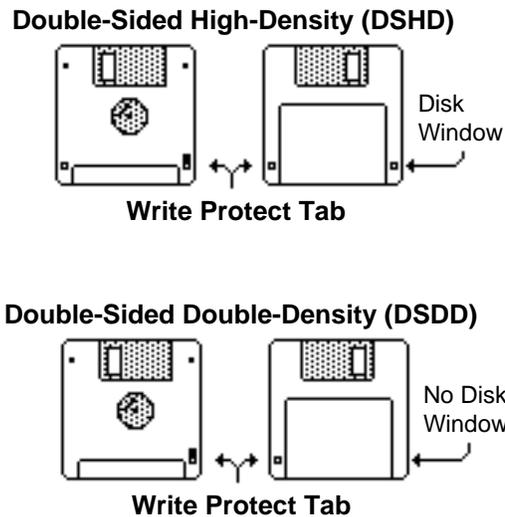
If you answer ***YES*** to the Auto-Load prompt, "WORKING..." is momentarily displayed when the TS-12 is preparing to load Sampled Sound files, then it will automatically load any needed files from the current disk in the disk drive, and from any connected SCSI Storage Devices.

For more information about the Auto-Load feature, see *Section 14 — Understanding Sampled Sounds*.

Care and Feeding of the Disk Drive

The TS-12's built-in disk drive is used to store all your Programs, Sampled Sounds, Presets, System set-up, and Sequencer data, as well as System Exclusive messages from other MIDI devices. The TS-12 uses a Quad-density disk drive that can store 1600 Kilobytes of data on a Double-Sided High-Density (DSHD) 3.5" micro-floppy disk and 800 Kilobytes of data on a Double-Sided Double-Density (DSDD) 3.5" micro-floppy disk. The disks are enclosed in a protective plastic carrier with an automatic shutter to protect the diskette from physical damage. It is important not to alter this carrier in any way.

The 3.5" disks have a sliding write-protection tab so that you can protect your sounds and sequences against accidental erasure. Sliding the write-protection tab in the lower left corner of the disk so that the window is closed will allow you to store information on the disk. Sliding the tab so that the window is open will protect the disk against being accidentally reformatted or having files deleted. Double-Sided High Density disks can be easily identified because they have an additional window (with no write-protection tab) located on the lower right corner of the disk.



Floppy disks are a magnetic storage medium, and should be treated with the same care you'd give important audio tapes. Just as you would use high quality audio tapes for your important recording needs, we recommend using high quality floppy disks for your TS-12. Here are a few Do's and Don't's concerning disks and the disk drive.

Do's:

- Use either Double-Sided High-Density (DSHD) or Double-Sided Double-Density (DSDD) 3.5 inch Micro-floppy disks. Both types are available from almost any computer store and many music stores carry them as well.
- Keep your disks and the disk drive clean and free of dust, dirt, liquids, etc.
- Label your disks and keep a record of what is saved on each.
- Only transport your unit with nothing in the drive.

Don't's:

- Don't use Single-Sided (SSDD or SSSD) disks. These disks have not passed testing on both sides. While a single-sided disk might work successfully with the TS-12, it is possible that you will eventually lose important data to a disk error if you try using Single-Sided disks.
- Don't put anything other than a disk or the plastic sheet in the disk drive.
- Don't transport the unit with a disk in the drive.
- Don't expose disks to extremes of temperature. Temperatures below 50° F and above 140° F can damage the plastic outer shell.
- Don't expose your disks to moisture.
- Don't dry your disks in a microwave oven.
- Don't subject disks to strong magnetic fields. Exposure to magnetic energy can permanently damage the information on the disk. Keep disks away from speaker cabinets, tape decks, power cables, airline x-ray equipment, power amplifiers, TV sets, and any other sources of magnetic energy.
- Don't eject the disk while the drive is operating (i.e. when the disk drive light is on).

Reinitializing the TS-12

The great power and flexibility of the TS-12 lies in the fact that it is really a computer disguised as a keyboard instrument, but a computer nonetheless. The software that operates the TS-12 is very sophisticated. If you have ever used a computer, you should be familiar with the need to occasionally re-boot your system when you get an error message, etc. Reinitializing the TS-12 is the equivalent of re-booting your computer.

There are a number of things that can happen to the TS-12 (or any computer system) which might scramble the system software — voltage surges, power failures, static electricity, etc. As with any computer, very infrequently some unforeseeable event or combination of events can cause the software to become confused, with strange and unpredictable results. Sometimes, computers that appear to be broken have no hardware problem, just corrupted data in the internal RAM (Random Access Memory). In some cases, simply turning the TS-12 power off and then on again will cure the problem. If that doesn't work, perhaps what is needed is to reinitialize the unit.

When to Reinitialize

If your TS-12 begins to behave in peculiar ways; if the display shows words or lines that shouldn't be there; if you start getting unexplained System Error messages; if the sequencer and edit functions start doing unpredictable things; try reinitializing the TS-12 before you seek factory service.

Be Careful!

When you reinitialize your TS-12, all your custom sounds, presets, and sequences in RAM will be lost. Therefore good backup habits should be an important part of your routine. Save any important data to disk before reinitializing the TS-12.

To Reinitialize the TS-12:

- While holding down the **Preset** button, press the “soft” button in the top left corner above the fluorescent display.
- The following message appears on the display: “ERASE MEMORY AND REINITIALIZE”
- Select ***YES***. After selecting ***YES***, the TS-12 erases its internal memory and then starts up just as it does when you turn the power on, and initialization is complete.

If reinitializing your TS-12 does not correct the problem, then contact an Authorized ENSONIQ Repair Station.

Low Battery Voltage — When to Replace the Battery

The reason that the TS-12 “remembers” programs, presets and other parameters, even when the power is off, is that all of its internal RAM is “battery-backed-up.” The battery that keeps the TS-12 memory intact is located inside the TS-12, and when it becomes discharged, it must be replaced by an Authorized ENSONIQ Repair Station.

The battery that came in your TS-12 is good for up to five years of life. You will know when it needs replacing, because the TS-12 will tell you so. One day you will switch the power on, and instead of its usual wake-up message, the display will read:

WARNING -- LOW BATTERY VOLTAGE
SAVE DATA - SEE USER MANUAL *CONTINUE*

Press ***CONTINUE*** (or any button) to commence normal operation. Then, make sure that all presets, programs, and sequences are saved to disk, and take the TS-12 to an Authorized ENSONIQ Repair Station as soon as possible to have the battery replaced.

Available Options for your TS-12

These optional accessories are available from your Authorized ENSONIQ Dealer:

- **ENSONIQ Model SW-10 Dual Foot Switch** — For voice sustain, sostenuto, hands-free patch select control, preset advance, effect modulation control, or starting, stopping, and continuing the internal sequencer. For ultimate foot control, we recommend using two SW-10 Dual Foot Switches.
- **Model CVP-1 CV PEDAL** — A *Control Voltage Foot Pedal* which can be assigned as a modulator within the voice section of the ASR-10 or used as a volume pedal.
- **AS -Series Sound Libraries** — The AS Sound Library sounds can be loaded and edited by the TS-12, provided on five High Density disks.
- **SL, SLT, and ESS Sound Libraries** — The TS-12 can read all of the sound files on the disks designed for the EPS Series. These disks offer the largest, most accurate, responsive, and musical sampled sounds available anywhere. These sounds are divided into three separate libraries: SL, a series of five-disk sets featuring sounds specifically designed for the EPS-16 PLUS, compatible with the TS-12; SLT, a series of ten-disk packs originally designed by top sound programmers for the EPS, also compatible with the TS-12; and ESS, three-disk "Signature Series" sets designed by renowned industry performers and producers like Joey DeFrancesco, Jason Miles, Maurice White, The System, Nile Rodgers, David Hentschel, and others.
- **SP-4 SCSI Kit** — This SCSI (Small Computer Serial Interface) allows the TS-12 to read Sampled Sound files from a hard drive, CD ROM player, or computer. The SP-4 *must* be installed by an Authorized ENSONIQ Repair Station.
- **CDR Series** — These CD ROMs offer a vast array of Sampled Sounds arranged in directories by file types. The CDR Series also features Direct Macros, which allows instant access (direct-dial) to any Sampled Sound file (the TS-12 can only read Sampled Sound files, and not ASR/EPS banks and sequence/song files).
- **SQX-70** — Sequence Expander. Increases the capacity of the TS-12 sequencer to over 97,000 notes. Contact your Authorized ENSONIQ Repair Station for installation details.

Need More Help?

Whether you're an aspiring programmer looking for additional information about basic synthesizer techniques and MIDI theory, or a professional sound designer working with advanced applications, you may want more detailed information that is beyond the scope of this manual. The following books can help enhance your understanding of sampling, synthesis, MIDI, and related topics. These, in addition to the numerous monthly magazines, provide a wealth of information. While we don't endorse any one of these publications, we offer this partial list as a resource for you to draw on.

The Mix Bookshelf

For prices and more information call: 1-800-233-9604

MIDI

MIDI FOR MUSICIANS, Craig Anderton

THE MIDI MANUAL, David Huber

THE MIDI HOME STUDIO, Howard Massey

THE NEXT MIDI BOOK, Rychner & Walker

THE MIDI BOOK, Steve De Furia, Joe Scacciaferro

THE MIDI RESOURCE BOOK, Steve De Furia, Joe Scacciaferro

HOW MIDI WORKS, Dan Walker

MIDI SYSTEMS & CONTROL, Francis Rumsey

USING MIDI, Helen Casabona, David Frederick

MIDI, THE INS, OUTS AND THURS, Jeff Rona

SAMPLING

THE SAMPLING BOOK, Steve De Furia, Joe Scacciaferro

SAMPLING BASICS, Bobby Maestas

SYNTHESIZERS

GUITAR SYNTH & MIDI, Guitar Player Magazine

SECRETS OF ANALOG AND DIGITAL SYNTHESIS, Steve De Furia

SYNTHESIZER PERFORMANCE & REAL TIME TECHNIQUES, Jeff Pressing

SYNTHESIZER BASICS, Dean Friedman

MUSIC & TECHNOLOGY, H.P. Newquist

A SYNTHESIST'S GUIDE TO ACOUSTIC INSTRUMENTS, Howard Massey

Alfred Publishing Company

For prices and more information call 1-818-891-5999

MIDI

ADVANCED MIDI APPLICATIONS, GPI

BASIC MIDI APPLICATIONS, GPI

WHAT IS MIDI?, GPI

SYNTHESIZERS

BEGINNING SYNTHESIZER, GPI

PLAYING SYNTHESIZERS, GPI

SYNTHESIZER PROGRAMMING, GPI

Hal Leonard Publishing

For prices and more information call 1-414-774-3630

MIND OVER MIDI, GPI

SYNTHESIZER TECHNIQUE (REVISED), GPI

Monthly Magazines

The following magazines offer many specific articles and columns that can provide a plethora of useful information.

THE TRANSONIQ HACKER

For prices and more information about this independent news magazine for ENSONIQ Users, call 1-503-227-6848

KEYBOARD

For subscription rates and more information call 1-800-289-9919

ELECTRONIC MUSICIAN

For subscription rates and more information call 1-800-888-5139

HOME & STUDIO RECORDING

For subscription rates and more information call 1-818-407-0744

MIX

For subscription rates and more information call 1-800-888-5139

EQ

For subscription rates and more information call 1-212-213-3444

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TS-12 MIDI Implementation

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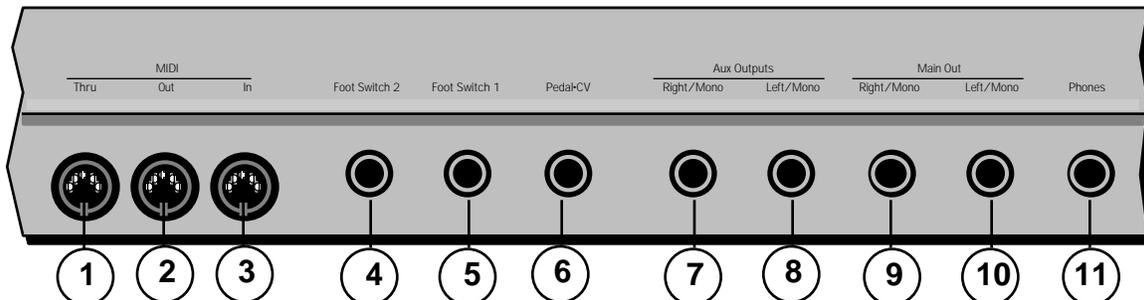
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TS-10 Index

Section 1 — Controls & Basic Functions

This section provides an introduction to the TS-12's many controls and rear panel connections, a conceptual overview of the system, and a discussion of editing various types of parameters. We suggest you read this section carefully — it will help you get the most out of your TS-12.

Rear Panel Connections



1) MIDI Thru

“Passes on” all MIDI (Musical Instrument Digital Interface) information received by the TS-12 to other MIDI devices. Information generated by the TS-12 itself does not go to this jack — the Thru jack merely echoes what comes into the MIDI In jack.

2) MIDI Out

Sends out MIDI information generated by the TS-12 keyboard and/or sequencer to other instruments and computers.

3) MIDI In

This jack receives MIDI information from other MIDI instruments or computers.

4) Foot Switch 2

5) Foot Switch 1

These two independent foot switch jacks support either a single (mono) or dual (stereo) foot switch, and can be assigned to a number of different functions, allowing a total of four independent foot switch controllers (when two optional SW-10 Dual Foot Switches are connected).

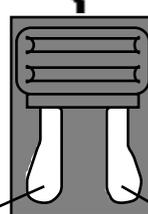
When either type of foot switch is plugged into the **Foot Switch 1** or **2** jack, it is completely programmable (on the System page), and can be used for sustain, sostenuto, Patch Select control, preset up/down, effect modulation, or sequencer control.

When the SW-2 is connected to either Foot Switch jack:



It functions as the right foot switch and is completely programmable.

When the SW-10 is connected to either Foot Switch jack:



Both the left and right Foot Switches are completely and independently programmable.

There are four parameters on the System page that let you assign the foot switches to a variety of functions. When a single foot switch is connected, set the left foot switch to *UNUSED* on the

System sub-page. For more information about assigning the foot switches, refer to *Section 2 — System Page Parameters*.

Note: If you are using a single foot switch (SW-2 or SW-6) in either of the **Foot Switch** jacks, the FOOT-SW1-L and/or SW2-L values on the System page should *always* be set to *UNUSED*. This will prevent note drones. Remember that the **Foot Switch** jacks are optimized for use with a stereo Foot Switch (SW-10), and when a single foot switch is connected, it behaves like the right foot switch.

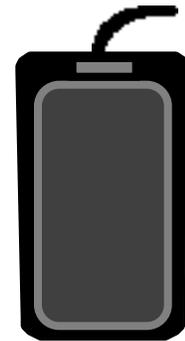
6) Pedal•CV

This jack is for connecting an optional ENSONIQ Model CVP-1 Control Voltage Foot Pedal, which is assignable as a modulator to various parameters within the TS-12. The pedal gives you a handy alternative modulation source when, for example, you would want to use the Mod Wheel but both hands are busy.

A CV pedal plugged into this jack can also act a volume pedal, controlling the volume of the currently selected sound(s). A parameter on the System page (press **System** twice, then underline PEDAL=VOL/MOD) determines whether the CV pedal will act as a modulator or as a volume pedal. Set to PEDAL=VOL to use the CV pedal to control volume.

Pedal/CV Specs: 3-conductor (Tip= control voltage input, Ring=510 ohm resistor to +5 Volts, Sleeve= ground). 36 KOhm input impedance, DC coupled. Input voltage range=0 to 3 volts DC. Scan rate=32mS (maximum recommended modulation input= 15 Hz). For use with an external control voltage, use a 2-conductor cable with the voltage on the tip and the sleeve grounded.

ENSONIQ
CVP-1
Control Voltage Foot Pedal



7) AUX Out Right/Mono

8) AUX Out Left/Mono

The AUX Outputs provide an additional stereo output for use in mixing down sequences, etc. The AUX Outputs contain the dry (no effects) signal only, allowing you to process and mix certain sounds separately. TS-12 sounds can be routed to the AUX Outputs from the Track Effects page, or individual voices can be set to the AUX Outputs from the Output page. When using the AUX Outputs in stereo, connect these outputs to two separate channels of your mixer and pan them left and right. If you want to have a mono AUX Output, make sure that only one of the AUX Out jacks is connected.

9) Main Out — Right/Mono

10) Main Out — Left/Mono

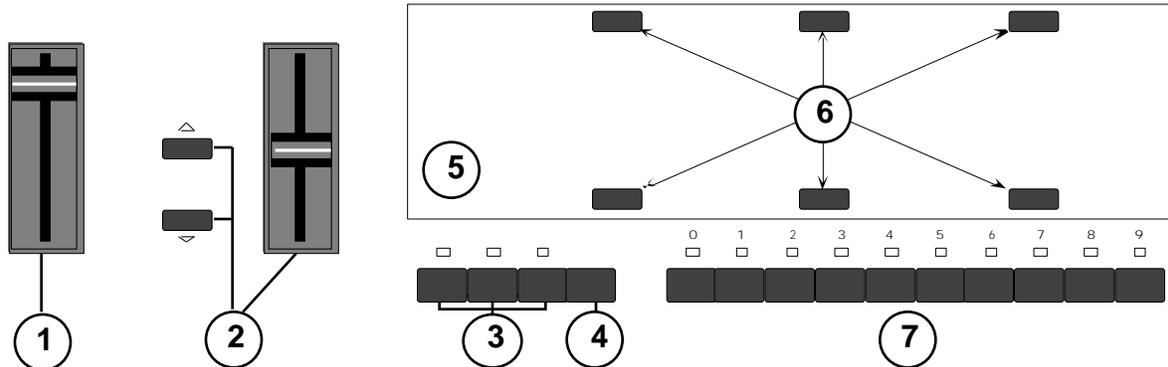
The Main Out jacks contain the wet (effected) output of the TS-12's effects processor. Any sounds or individual voices routed to FX1, FX2, or DRY will be routed to the Main Outs. To operate the TS-12 in stereo, connect these outputs to two discrete channels of your mixer and pan them left and right. Note that *either* of the Main Outs can be used as a mono output. If you want to listen to the main output in mono, make sure that only one of the Main Out jacks is connected.

11) Phones

To listen to the TS-12 in stereo through headphones, plug the phones into this jack. The **Phones** output contains a mix of the signal from the Main Outputs and the AUX Outputs. Headphone volume is controlled by the **Volume Slider** on the front panel. Note that plugging headphones into this jack does not automatically turn off the audio in the Main or AUX Outputs.

Front Panel Controls

Almost everything you do on the TS-12, whether it's selecting a sound, editing that sound, adjusting the tuning, etc., is controlled from the front panel using the following controls:



1) Volume Slider

This controls the overall volume of the TS-12 audio outputs.

2) Data Entry Controls

The **Data Entry Slider** and the **Up** and **Down Arrow** buttons to the left of the display are primarily used to *select* and *modify* things — sounds, parameters, keyboard touch, MIDI Control functions, etc. — all depending on which front panel button you press.

3) Mode Buttons

These 3 buttons are used to select the current mode; you will always be in one of these modes:

- **Sequencer Mode** — The **Seqs/Songs** button is used to put the TS-12 into Sequencer mode. The ten **Bank** buttons (labeled 0-9) will select Sequencer banks. Each bank contains six sequencer locations, any of which can contain a sequence or a song, or may be blank. When the TS-12 is in Sequencer mode, the LED above the **Seqs/Songs** Button will light. Note that when the sequencer is playing, you cannot enter either Sounds or Presets mode.
- **Presets Mode** — The **Presets** button is used to put the TS-12 into Presets mode. The **BankSet** button will scroll through the five different Preset BankSets. The ten **Bank** buttons will select Preset Banks within each BankSet. Each Preset Bank contains six different presets. Add all this up, and you get a total of 300 different presets (120 User-programmable and 180 ROM)! Each Preset contains three sound locations called “Tracks”, any of which can contain a User RAM Program, ROM Program, or Sampled Sound. When the TS-12 is in Presets mode, the LED above the **Presets** Button will light, and the bottom left-hand corner of the display will show PSET.
- **Sounds Mode** — The **Sounds** button is used to put the TS-12 into Sounds mode. The **BankSet** button will scroll through the different Sound BankSets. The ten **Bank** buttons will select Sound Banks within each BankSet. Each User RAM and ROM Program Bank contains six different programs. Sampled Sound Banks contain one Sampled Sound per Bank. When the TS-12 is in Sounds mode, the LED above the **Sounds** button will light.

4) BankSet Button

A BankSet is a collection (or “set”) of 10 Banks of Sounds or Presets. The **BankSet** button is used to select different BankSets in Sound and Preset Modes. Repeated presses of the **BankSet** button will scroll through all of the available BankSets.

Tip: There is a quick way to “direct-dial” between different BankSets in both Sounds and Preset modes. Simply press the **BankSet** button and while holding it down, press the appropriate **Bank** button. Bank buttons 0 and 1 select User RAM BankSets, and Bank buttons 2, 3, and 4 select ROM BankSets. Bank button 8 (and if expansion SIMMs are installed, Bank button 9) selects the Sampled Sound BankSet (in Sounds mode only). This enables you to “call up” the BankSets rapidly, in any order.

Tip: Because you can use the **BankSet** button and the ten **Bank** buttons to “shop around” in various banks before selecting a sound or preset, it is possible to lose track of where the currently selected sound or preset (the one you are hearing) is located. There is a shortcut for getting back to the **BankSet** and **Bank** that contains the currently selected sound or preset: rapidly double-click the **Sounds** button or the **Presets** button to instantly go to the **Bank** that contains the currently selected sound or preset.

5) Display

The 80-character fluorescent display makes it possible to show information in *Pages*. Each time you press one of the front panel buttons, you are in effect “turning to” that function’s page. Once you have turned to the page you want, the display shows you which parameters are controlled from that page. Try pressing a few of the buttons — **System**, **Mix/Pan**, **LFO**, or **Filters**, for example, and watch the display. Notice that for each button you press, the display changes to show you information relating to that function. Each of these different display configurations is called a *Page*.

6) Soft Buttons

The six soft buttons above and below the display have a new function each time you select a new page — that is, each time you press one of the dedicated front panel buttons. Each of the six soft buttons is used to select whatever is directly above or below it on the display. Because their function varies depending on what is displayed, we refer to these buttons as *Soft Buttons*, to distinguish them from buttons which have fixed “hard” functions, such as the Track Parameter buttons to the right of the display.

7) Bank Buttons

In Sequencer mode, the ten **Bank** buttons (labeled 0-9) will select Sequencer banks. Each bank contains six sequencer locations, any of which can contain a sequence or a song, or may be blank.

In Presets Mode, the ten **Bank** buttons (labeled 0-9) will select Preset banks within the current **BankSet**. Each bank contains six preset locations. Pressing the **BankSet** button will change the current **BankSet**, and the **Bank** buttons will now select Preset banks within the newly selected **BankSet**. There are five different **BankSets** of Preset Banks (two in User RAM, three in ROM), for a total of 300 different presets.

In Sounds Mode, the ten **Bank** buttons (labeled 0-9) will select Sound banks within the current **BankSet**. There are three different kinds of sound banks within the TS-12. Each User RAM program bank contains six sound locations. Each ROM program bank contains six sound locations. Each Sampled Sound bank contains one sound location. We call these *Sound Bank pages*. Pressing the **BankSet** button will change the current **BankSet**, and the **Bank** buttons will now select Sound banks within the newly selected **BankSet**.

Double-Click Symbol

∨ This symbol appears in several places on the front panel, and helps to identify buttons that offer a special “double-click” (pressing two times rapidly) feature. These are:

- Rapidly double-click the **Sounds** button or the **Presets** button to instantly go to the **BankSet** and **Bank** that contains the currently selected sound or preset.
- Rapidly double-click the **Track Effects** button to bypass the effect for all sounds in a song, sequence or preset.
- Rapidly double-click the **Replace Track Sound** button to replace the sound on a track with another sound, and install the new sound’s effect settings.
- Rapidly double-click the **Select Voice** button to edit all of the unmuted voices within a Program.
- When a song is selected, rapidly double-click the **Seq/Song Track 1-6** and/or **7-12** to toggle between the sequence and song tracks.

Parametric Programming

The method used to modify or edit sounds, presets and system parameters is called *Page-driven Parametric Programming*, which sounds like a mouthful, but don't worry. Once you've grasped a few basic concepts, you'll find that operating the TS-12 is quite simple, given its many capabilities.

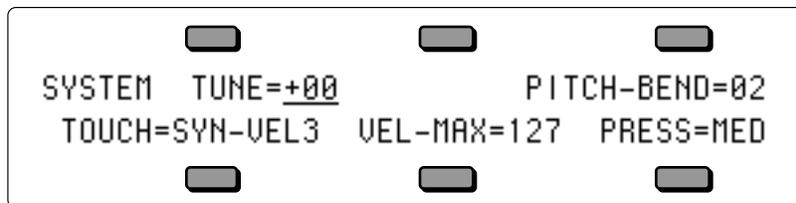
It is likely that you have already encountered some form of parametric programming on other synthesizers. What this means is that instead of having a separate knob or slider for each function, you have one master **Data Entry Slider**, and two **Arrow** buttons, which adjust the value of whichever parameter you select. This approach has many advantages, the most obvious is that it greatly reduces the amount of hardware — knobs, switches, faders, etc. — needed to control a wide variety of functions. (If the TS-12 had a separate control for each function, it would literally have hundreds of knobs.)

Sub-pages

Some of the TS-12 pages contain more than one screen of information. Repeatedly pressing the same page button will cycle through the sub-pages.

Changing a Parameter

Suppose you want to adjust the master tuning of the TS-12. Press the front panel button labeled **System**. The display now shows the System page:



In the top left-hand corner of the display you will always find the *name* of the page that corresponds to the button you pressed. To the right and below the page name are various parameters and commands that can be selected and modified from this page.

To raise or lower the tuning of the TS-12, press the soft button directly above where it says TUNE=+00. This segment of the display will now be underlined, telling you that it has been selected, and can be modified.

The currently selected parameter on a page is always underlined.

Once you have selected a parameter to be modified, use the **Data Entry Slider** and the **Up/Down Arrow** buttons to the left of the display to adjust its value:

- Moving the slider will scroll the entire range of available values. If you move the slider slowly, it will edit the parameter relative to its current value. Moving it quickly will cause the parameter to jump to the absolute value that corresponds to the position of the slider.
- Pressing the **Up/Down Arrow** buttons will increase or decrease the value one step at a time. Continuing to hold down either button will cause it to accelerate and run quickly through the values.

Tip: There is a quick way to center or “zero out” the value of any parameter which has a center value, as the ATTACK parameter does. Press the **Down Arrow** button, and *while holding it down*, press the **Up Arrow** button, then quickly release both buttons. This automatically sets the parameter value to +00.

To select and modify another parameter on the same page, press the soft button above or below its name. That parameter will now be underlined, and its value can be adjusted as before, with the **Data Entry Slider** and the **Up/Down Arrow** buttons.

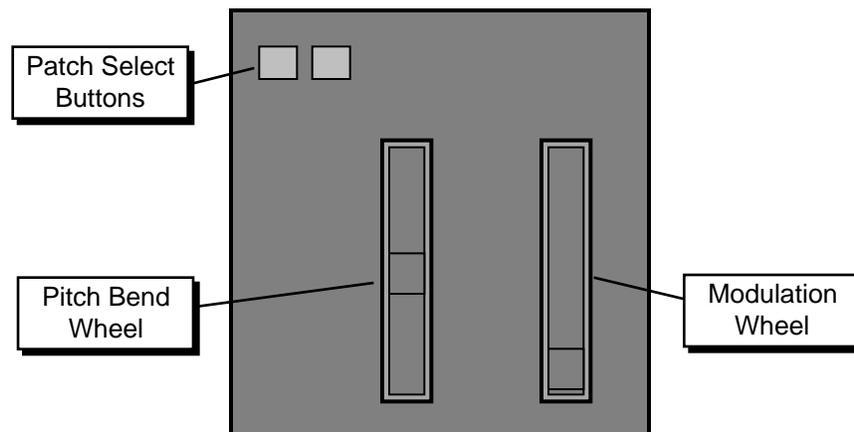
If you select another page, change some parameter on that page, and then return to the System page, the parameter you had last selected will still be underlined. The TS-12 always “remembers” which parameter was last selected on a given page (including each sub-page).

Be sure that the parameter you want to edit is selected before moving the **Data Entry Slider** and/or the **Up/Down Arrow** buttons. There is *always* a parameter selected on any given programming page.

Sometimes the soft buttons are used to select values in “multi-field” parameters. For instance, in Sounds or Presets mode, press the **Tuning** button. Press the soft button beneath the Transpose parameter for any sound. Notice that the first field of the Transpose parameter (the Octave field) is selected. Press the same soft button again. This selects the Semitone field of the parameter. Successive presses of the soft button closest to the values moves the cursor from one field to another.

Performance Controllers

The TS-12 features a number of real-time performance controllers which are used to modify sounds as you play for maximum expressiveness. Three of the most important controllers are located to the left of the keyboard:



- **PATCH SELECT BUTTONS** — These two buttons are used to select alternate groups of voices within a sound. The TS-12 can be programmed so that the sound changes (sometimes in subtle ways, sometimes radically) when you play notes with one or both Patch Select buttons held down. As you play the sounds in the TS-12, make sure you explore what these buttons do to each sound.
- **PITCH BEND WHEEL** — This wheel bends the pitch of a note up or down. The wheel is normally centered, where it has no effect on the pitch — moving the wheel up or down will bend the note by the amount specified in the **BEND** parameters contained on the System page (for global bend range) and on the Pitch Mods page (for setting each individual voice's bend range separately).

- **MODULATION WHEEL** — Perhaps the most common use of the Mod Wheel is to add vibrato, but it can also be assigned as a modulator anywhere within the TS-12 voice architecture to alter the pitch, brightness, volume, effect parameters, and a great many other aspects of the sound.

Pressure (After-touch)

Another important controller is *Pressure*. Pressure (often called after-touch) is a modulator that allows you to change the sound in various ways by pressing down harder on a key or keys after the initial keystroke. The TS-12 keyboard is capable of generating Channel Pressure and can receive Poly-Key™ Pressure via incoming MIDI.

Like the mod wheel or foot pedal, pressure is a modulator, and can be chosen wherever a modulator is selected in the Programming section of the TS-12. Pressure can be assigned to alter the pitch or volume of voices, the filter cutoff frequency, LFO rate or depth, pan location, etc.

There are two types of Pressure:

- Channel Pressure, also called Mono pressure, affects all notes that are playing when you exert pressure on any of the keys. For example, if you play a three-note chord, pressing down harder on any of the three notes of the chord will modulate *all three notes*. This type of pressure is the more common of the two types.
- Poly-Key Pressure, also referred to as polyphonic pressure, affects each key independently. For example, if you play a three-note chord, pressing down harder on any of the three notes of the chord will modulate *only that note*. The other two notes will remain unaffected. Although the TS-12 keyboard will not generate Poly-key pressure, it will receive it via incoming MIDI.

Each preset or sequencer track can be programmed to receive Poly-Key pressure, channel pressure or none at all. If you wish to change the pressure type for a given track, you can do so on the second sub-page of the Performance Options page in the Track Parameters section of the TS-12.

Note that pressure generates a tremendous amount of data, and will consume sequencer memory much faster than other types of events, such as notes and program changes. You should turn pressure off when sequencing instruments which do not respond to pressure, such as piano and drum sounds.

Playing Sounds and Presets

Sound Memory

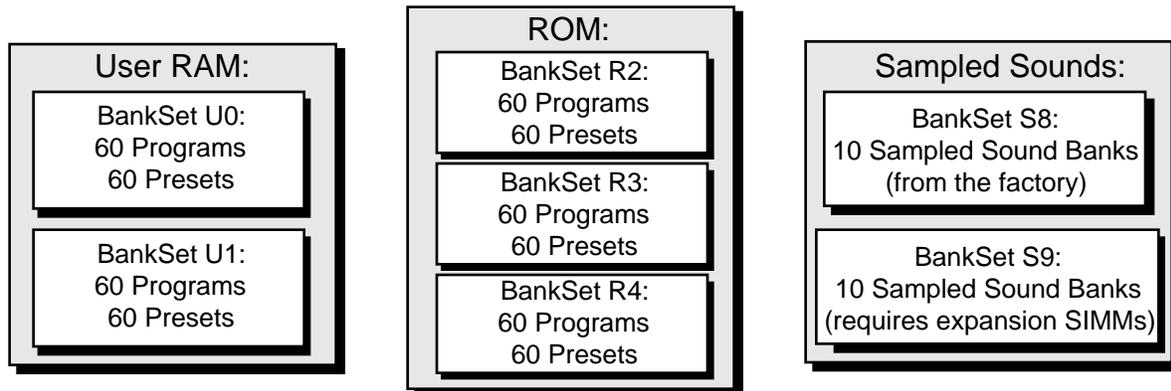
Each TS-12 *internal* sound (ROM and User RAM) is a complex structure consisting of up to six voices per key and a programmable effects setup. We refer to these internal sounds as *Programs*. Sounds that were created with a sampling keyboard (and are not internal—i.e.: must be loaded from disk after power-on) are referred to as *Sampled Sounds*. In this manual, we will use the word *sound* to describe both Programs (ROM and User RAM), as well as Sampled Sounds.

As it comes from the factory, the standard TS-12 has 300 different sounds:

- User RAM — 2 BankSets of 60 programs each are stored in *Static* RAM.
- ROM (Read Only Memory)— 3 BankSets of 60 programs each are permanently stored in ROM. Like the User RAM programs, the ROM programs are contained within the TS-12; but unlike the User programs, they cannot be modified or replaced.

Sampled Sound Options:

- Sampled Sounds — 1 BankSet of 10 Sampled Sounds each are stored in *Dynamic* RAM. Sampled Sounds are not internal sounds. This means that when the TS-12 power is turned off, any Sampled Sounds will need to be reloaded. Note that when Sampled Sounds are selected, polyphony is reduced to 31 voices.
- Expanded Sampled Sounds — When optional expansion SIMMs are installed (by an Authorized ENSONIQ Repair Station), 2 BankSets of 10 Sampled Sounds each are stored in *Dynamic* RAM.

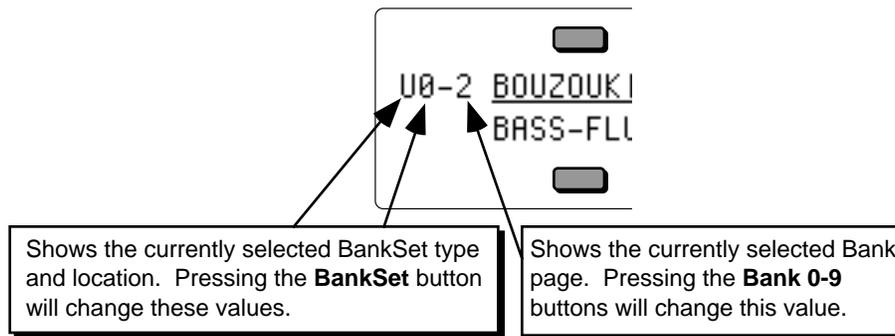


Sounds and Presets stored in User RAM Memory can be played, edited, and replaced with other sounds or presets.

Sounds and Presets stored in the ROM Memory locations can be played and edited, but cannot be erased. Edited versions can be stored in User RAM.

Sampled Sounds are stored in Dynamic RAM, and will not be saved internally when the TS-12 is turned off.

Using the BankSet Button



The **BankSet** button is used to scroll through the available BankSets. The display will change with each press, showing the currently selected BankSet. In the top left corner of the display, you will find the BankSet type and location, and the currently selected bank page.

Tip: There is a quick way to “direct-dial” between different BankSets in both Sounds and Preset modes. Simply press the **BankSet** button and while holding it down, press the appropriate **Bank** button. **Bank** buttons 0 and 1 select User RAM BankSets, **Bank** buttons 2, 3, and 4 select ROM BankSets, and **Bank** button 8 selects the Sampled Sound BankSet. If SIMMs are installed, **Bank** buttons 8 and 9 select Sampled Sound BankSets (in Sounds mode only). This enables you to “call up” the BankSets rapidly, in any order.

Once you have selected a User RAM, ROM, or Sampled Sound BankSet, select a sound using the ten **Bank** buttons and the soft button closest to the sound name as shown previously.

Selecting a Preset

To select a TS-12 preset:

- If you are in any mode other than Presets mode, press **Presets** (the Presets LED should be lit).
- Press one of the 10 **Bank** buttons below the display (numbered 0-9) to select a bank of six sounds. The display shows you the names of the six presets in each bank.
- Press the soft button above or below any of the six preset names to select that preset. Try selecting and playing a few different presets. Notice that when you select a preset, its name is underlined. The currently selected preset is always underlined.

Selecting a Sound

To select a TS-12 sound:

- Press **Sounds**.
- Press one of the 10 **Bank** buttons below the display (numbered 0-9) to select a bank of six programs. The display shows you the names of the six programs in each bank.
- Press the soft button above or below any of the six program names to select that program as the current sound. Try selecting and playing a few different programs. Notice that when you select a program, its name is underlined. The name of the currently selected sound is always underlined.

Layering (Stacking) a Sound with the Selected Sound

To layer (or stack) any sound with the currently selected sound, *double-click* the soft button corresponding to the sound name on the display. The underline beneath the name of the layered sound will *flash* and you will hear both sounds playing together.

Up to three sounds (one selected and two layered with it) can be active at once. To de-select a layered sound, press its soft button again and the flashing underline will disappear. If you already have two sounds layered with the primary sound, and you double-click on a fourth sound, that sound will replace the most recently layered sound in the stack.

If two tracks are layered, selecting a new primary track that has a KEY ZONE that does not overlap the layered track will not de-select the layered track. You can layer any combination of User RAM, ROM, or Sampled Sounds. Also, the sounds that are layered do not have to be in the same BankSet or bank.

Primary Sound vs. Layered Sounds

We refer to the sound which is currently selected (solidly underlined on the display) as the *primary* sound. Any other sounds that you double-click are considered to be *layered* with the primary sound. Only one sound is ever *selected* at a time. Whenever you select a new sound it becomes the primary sound.

This is an important concept, because the primary sound determines which Effects set-up will be used for layers and presets. Whenever you select a new primary sound in Sounds mode, a new effects algorithm is loaded along with it (unless the new sound has the same effect and settings as the previous one). Note however that layering a sound or selecting a different sound in Presets mode does *not* change the current effects set-up.

The SoundFinder™ Feature

When you press the **Replace Track Sound** button (its LED is lit), you can press the **Up** or **Down Arrow** buttons to scroll through Programs that have the same defined Program Type (as defined on the Program Control page). This is a great way to hear all available variations of a particular type of sound, and it is very useful in auditioning similar sounds for a sequence or song track. Note that you can audition the sounds as the sequencer plays, but to make the changes permanent, you must first stop the sequencer.

Note: Because a Sampled Sound cannot be assigned a Program Type, the SoundFinder feature will not work with Sampled Sounds or Sample Edits.

Note: You must load the 120-PROGRAMS file called USERBNKS V2 from the TSD-200 disk in order for this feature to work properly with the User RAM Programs.

Tip: By double-clicking the **Replace Track Sound** button (LED flashing), you can use the **Up/Down Arrow** buttons to select Programs by type along with their effect settings, just as you would in Sounds mode.

Tip: On the Program Control page, the TYPE=CUSTOM setting can be used to define your own special purpose sound type to help you quickly find your own sounds with SoundFinder. ENSONIQ sounds will never be released with TYPE=CUSTOM. For more information about the Program TYPE parameter, see *Section 9 — Program Parameters*.

Using SoundFinder in Sounds Mode

Here's how to select Programs that have the same defined Program Type in Sounds mode. For this example, load the 120-PROGRAMS file called USERBNKS V2 from the TSD-200 disk that came with your TS-12 before continuing with the following steps:

- Press the **Sounds** button.
- While holding down the **BankSet** button, press the **Bank 0** button. This selects User RAM BankSet U0.
- Press the **Bank 0** button to select the first Bank in User RAM BankSet U0. The display shows:



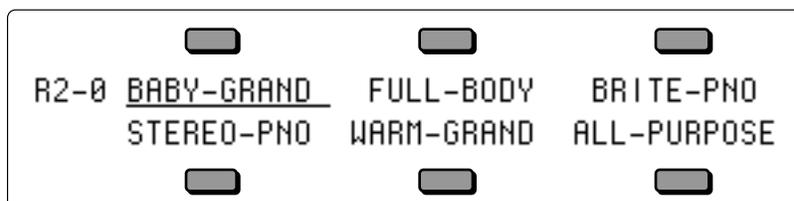
- Press the upper middle soft button above GRAND-PIANO (it should now be underlined). We'll be listening to some of the TS-12 sounds that are assigned the same Program Type as GRAND-PIANO.
- If you want to see which Program Type is assigned to a particular Program, press the **Program Control** button. For GRAND-PIANO, the display shows:



- This display shows the PROGRAM TYPE assigned to the currently selected Program. The Program Type assigned to GRAND-PIANO is ACPIANOS, which denotes acoustic pianos. See *Section 9 — Program Parameters* for a complete listing of Program Types.

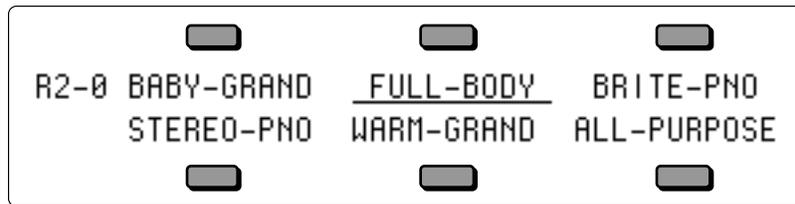
When GRAND-PIANO is selected, SoundFinder will allow us to view all Programs assigned to the AC PIANOS Program Type.

- Press the **Bank 0** button. GRAND-PIANO should still be selected (underlined). If it is not, select it at this time.
- Double-click the **Replace Track Sound** button. Its LED should be lit.
- Press the **Up Arrow** button. The display now shows:



- BABY-GRAND (now underlined) is the next Program in the TS-12 assigned to the AC PIANOS Program Type. You can play it if you wish.

- Press the **Up Arrow** button again. The display now shows:



- **FULL-BODY** (now underlined) is the next Program in the TS-12 assigned to the AC PIANOS Program Type. Continued presses of the **Up** or **Down Arrow** buttons will scroll through all of the Programs within the TS-12 assigned to the ACPIANOS Program Type.
- When you've found the Program that you want, press **Sounds** to exit the SoundFinder feature. The **Replace Track Sound** LED will no longer be lit.

Understanding Tracks

There are two main performance modes in the TS-12; *Preset mode*, which has 3 tracks, and *Sequencer mode*, which has 12 tracks. In the TS-12, the term *track* refers to a “channel” that contains a sound and a complete set of track performance parameters, including mix, pan, controller settings, MIDI channel, keyboard zone, and others. The 3 tracks in a preset, and 12 in a sequence, give you access to 15 internal tracks, each one independent of the others. Song mode offers 24 tracks (combined with the presets mode, you can have a total of 27 tracks). The difference between sequence and preset tracks is that you can record data on sequencer tracks and not on preset tracks.

Multi-channel audio tape recorders have numerous physical tape tracks onto which you can magnetically record complex polyphonic information. Sequencers simulate this by recording events which describe a performance onto similar tracks in computer memory. When these sequence tracks are played back, the recorded information can either play local sounds or can be sent to remote MIDI devices to recreate the performance. Multi-timbral MIDI instruments can respond to inbound information from such sequencers on multiple channels, with each channel responding independently to a track from the sequencer.

When the TS-12 is used as a multi-timbral sound generator, played from its own sequencer, the various tracks of the sequencer control the sounds played by the TS-12. Similarly, the sequencer and/or the keyboard of the TS-12 can be used to transmit on MIDI channels to which external MIDI devices are connected.

When the TS-12 is controlled from an external MIDI sequencer, the various tracks of the sequencer can be assigned to different MIDI channels, which in turn control the programs played by the TS-12. Each MIDI channel that the TS-12 responds to can be thought of as an extension of the sequencer's track.

Whether it is playing locally, sending MIDI to a remote device, or receiving MIDI from an external sequencer, we describe this logical construct, comprised of a sound, a MIDI channel, and various performance parameters, as a track.

Sampled Sounds and SIMMs

The TS-12 has the ability to read and edit sample sound files created for the EPS, EPS-16 PLUS, and the ASR-10 samplers. *Sampled Sounds* (as they are called in the TS-12) are stored in *Dynamic RAM*, and are not saved when the TS-12 power is turned off. From the factory, the TS-12 has two internal SIMMs, and provide 2 Megabytes of 16-bit sample RAM.

For more information about loading, selecting, and using Sampled Sounds in Presets, Sequences and Songs, see *Section 14 — Understanding Sampled Sounds*.

How Many SIMMs?

The TS-12 offers two SIMM options:

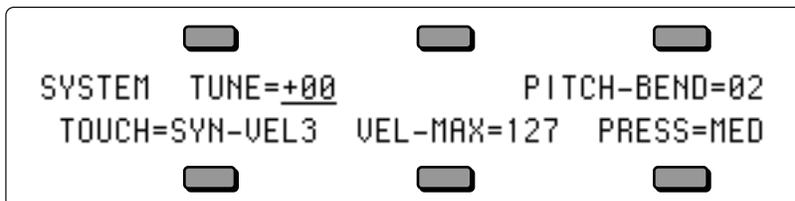
- With two 1m x 8 non-parity SIMMs (as it ships from the factory) — 1 BankSet (S8) is available (1 BankSet consists of 10 Sampled Sound Banks). The BankSet will hold 1MWord of Sampled Sound information, equivalent to 4018 blocks of memory.
- With two expansion 4m x 8 non-parity SIMMs — 2 BankSets (S8 and S9) of 10 Sampled Sound Banks each are available. Each BankSet will hold 2MWords of Sampled Sound information, for a total of 4 MWords, offering 8114 blocks of memory for BankSet S8, and 8191 blocks for BankSet S9.

Warning!

Because adding expansion SIMMs requires opening the TS-12 casing (which voids the ENSONIQ Warranty), SIMMs are not user-installable, and must be installed by an Authorized ENSONIQ Repair Station. To prevent damaging your TS-12, and/or causing bodily injury, do not attempt to install the SIMMs yourself.

Section 2 — System Page Parameters

These parameters control instrument-wide system functions. The settings of these parameters will remain in effect at all times and are preserved while the power is off. You can back-up the settings of the System Page parameters for quick recall by saving the System Set-up on the Storage page (see *Section 13 - Storage* for more information). The System Page has three sub-pages. Press the **System** button to display the first sub-page:



TUNE

Range: -99 to +99 cents

Adjusts the overall master tuning of the keyboard up or down as much as one semitone. A value of +00 will set the TS-12 to concert A= 440 tuning.

PITCH-BEND

Range: 00 to 12 semitones

Held Range: 00H to 12H semitones

Adjusts the system pitch bend range, which is the maximum amount of pitch bend that can be applied with the pitch wheel. Each increment represents a semitone.

The bend range will apply to all programs *except* those which have been programmed to override the system bend range. If you adjust the system bend range, and a program does not seem to pitch-bend the correct amount, check the setting of the BEND parameter on the Pitch Mods page for each voice in that particular program. If BEND=SYS, then the program uses the system bend range. Otherwise, the program has its own bend range and will ignore the system bend range.

The “H” suffix on the semitone value indicates that Held Pitch Bend mode is active. In this mode, only keys that are actually being held down will be affected by the pitch bend wheel.

TOUCH

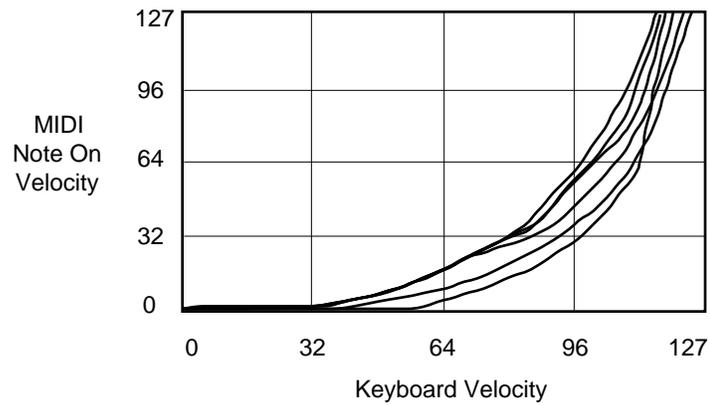
Range: (described below)

Allows you to adjust the velocity response of the keyboard to match your playing style and technique. All velocity curves affect both internal dynamic response and the velocity values transmitted via MIDI. There are 14 velocity response (Touch) settings:

- PNO-VEL1
- PNO-VEL2
- PNO-VEL3
- PNO-VEL4
- PNO-VEL5
- PNO-VEL6
- SYN-VEL1
- SYN-VEL2
- SYN-VEL3
- SYN-VEL4
- SYN-VEL5
- SYN-VEL6
- FIXED-64
- FIXED127

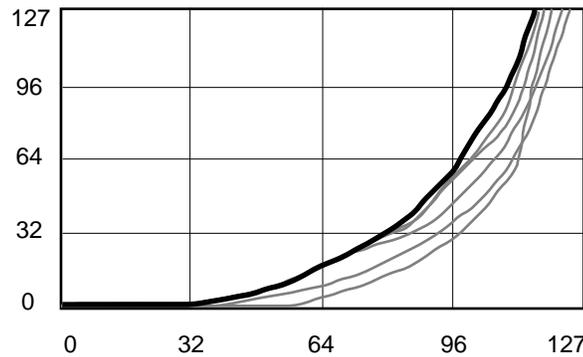
Note: When using a Piano velocity curve (PNO), pressing a key down very slowly and softly will yield *no* sound. This is exactly how a real piano key would respond. When using a Synth velocity curve (SYN), pressing a key down very slowly and softly will *always* yield a sound. This is the *only* difference between a PIANO velocity curve and a SYNTH velocity curve.

Velocity Curve Diagram



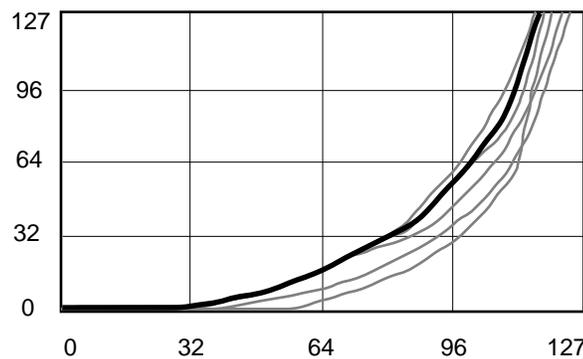
The Velocity Response Curves (Touch) offer a lot of control for a wide range of playing styles, as detailed in the following pages:

VEL1



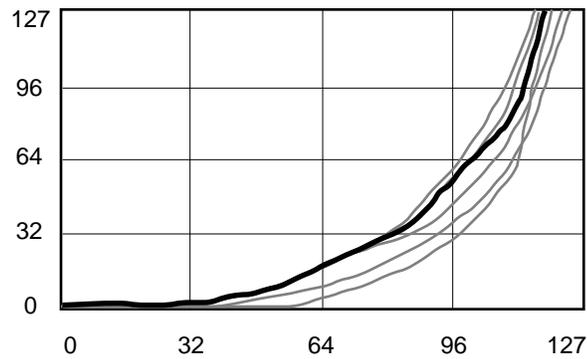
- PNO/SYN-VEL1 — This is for someone with a light touch. On this setting, it is easier to reach the maximum level of any velocity controlled parameter.

VEL2



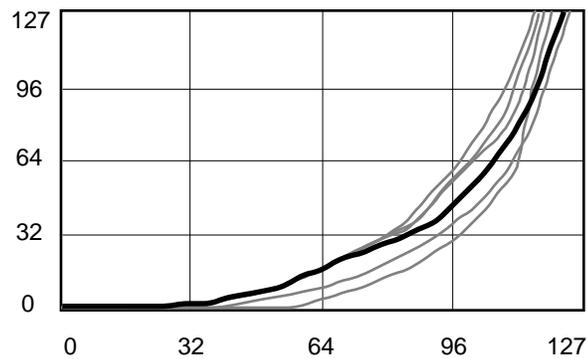
- PNO/SYN-VEL2 — Slightly harder key strikes are required for average playing, but this still allows a softer touch to reach maximum velocity levels.

VEL3



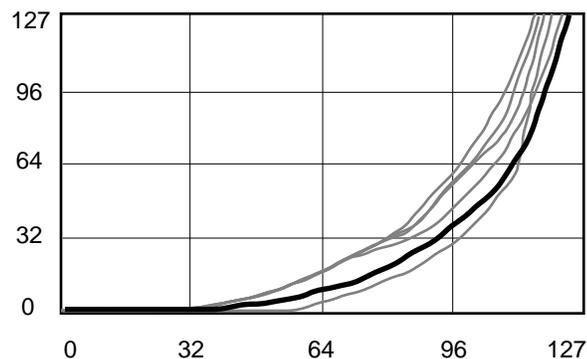
- PNO/SYN-VEL3 — This default setting represents average velocity sensitivity. This setting should be right for most players.

VEL4

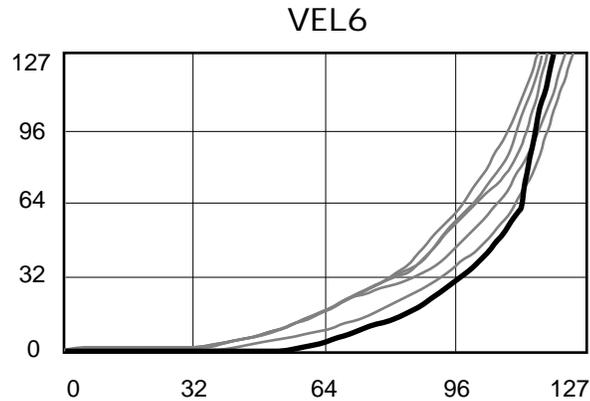


- PNO/SYN-VEL4 — This velocity best represents the “classically-trained” player with strong fingers, and offers the widest dynamic range for skilled pianists.

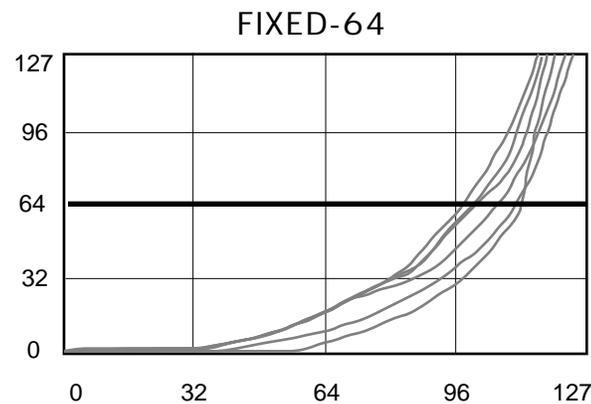
VEL5



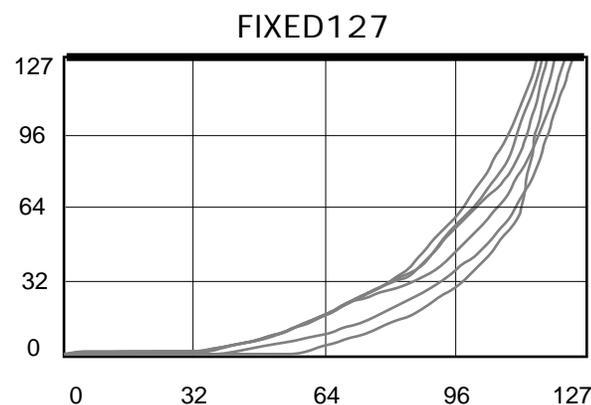
- PNO/SYN-VEL5 — This setting offers a smooth curve for players with strong fingers who desire a softer sound. It requires strong playing to reach the top velocity levels.



- PNO/SYN-VEL6 — This velocity setting is for the player who wants a lot of control over their softer playing. The curve dedicates most of its range to a gradual increase in volume, with a quick “spike” at the end to still allow full volume accents.



- FIXED-64 — With this setting the velocity curve always generates a fixed value, set at the halfway point. This may be useful in simulating old synth sounds that originally had no velocity control.



- FIXED127 — This setting is also a fixed velocity curve, with full volume. This is good for playing drum/percussion parts when you want a part without dynamic changes.

Note: We recommend starting with the default setting (SYN-VEL3), then going up or down to find your optimal setting.

VEL-MAX

Range: 001 to 127

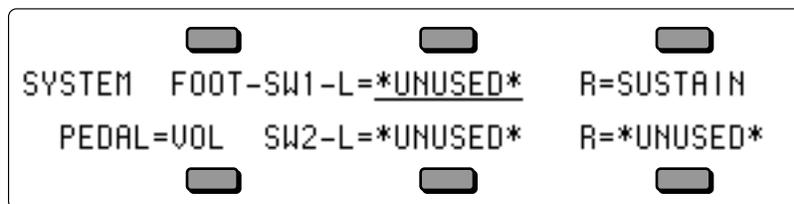
This parameter determines the maximum keyboard velocity value that will be recognized and transmitted by the TS-12. The default setting is 127, which allows for the normal full range of velocity values. Lower settings limit the maximum value that will be used internally and sent out via MIDI. This can be useful when controlling devices which do not respond to the full range of velocity values, or can be used in conjunction with the TOUCH parameter to control just the top part of the velocity response curve. When TOUCH=FIXED-64 or 127, this parameter can be used to set the fixed velocity to any value.

PRESS

Range: SOFT, MED, FIRM, and HARD

Allows you to adjust the pressure threshold of the keyboard to match your playing style and technique. PRESS affects both internal pressure response and the pressure values transmitted via MIDI. When set to SOFT, the least amount of pressure is required to generate channel pressure. Similarly, HARD requires the greatest amount of pressure to generate channel pressure.

Press the **System** button again to display the second sub-page:

**FOOT-SW1-L**— Foot Switch 1, Left Pedal**R**— Foot Switch 1, Right Pedal**SW2-L**— Foot Switch 2, Left Pedal**R**— Foot Switch 2, Right Pedal

When the *optional* SW-10 Dual Foot Switch is plugged into either Foot Switch jack, the settings of these parameters will control the function of the pedals. You can even use two SW-10 Dual Foot Switches plugged into both Foot Switch jacks, and have four completely independent controllers.

If you are using the single SW-2 Foot Switch which came with the TS-12, you should keep both left foot switch parameters set to *UNUSED*, and assign the right foot switch parameters to the desired function. The list of available parameters are:

- *UNUSED* — makes the TS-12 ignore the Foot Switch.
- SUSTAIN — holding the Foot Switch down will cause notes to sustain after a key has been released, much like the sustain pedal on a piano. Transmitted via MIDI as Controller #64.
- SOSTENUTO — makes the Foot Switch act similar to the sostenuto pedal on a piano. Any keys that are held down when you press the Foot Switch are sustained until you release the Foot Switch, but subsequent keys are not affected. Transmitted via MIDI as Controller #66.
- PATCH R — makes the Foot Switch act like the right patch select button.
- PATCH L — makes the Foot Switch act like the left patch select button.
- FX-SW-MOD — makes the Foot Switch into an assignable effect modulator. Setting SRC=FX-SW on any Effect MOD page allows you to use the Foot Switch to modulate the assigned parameter. Transmitted via MIDI as Controller #12.
- PRESET-UP — each time the Foot Switch is pressed, the TS-12 advances to the next Preset. When the next preset is in a different BankSet and/or bank, the preset BankSet and/or bank will also be switched. For example, at preset #59 of User RAM Bank U0-9, it jumps to preset #00 of User RAM Bank U1-0. At preset #59 of User RAM Bank U1-9, it jumps to preset #00 of ROM Bank R2-0. At the end of the ROM banks, it jumps back to User RAM Bank U0-0.
- PRESET-DN — each time the Foot Switch is pressed, the TS-12 selects the previous Preset (functioning just the opposite to PRESET-UP).
- PLAY/STOP — the Foot Switch will play and stop the sequencer, exactly reproducing the

actions of the **Play** and **Stop** buttons on the front panel.

- **STOP/CONT** — the Foot Switch will stop and continue the sequencer, exactly reproducing the actions of the **Stop/Continue** button on the front panel.
- **STEP-REC** — this setting allows the Foot Switch to be used in Sequencer Step Entry record mode to advance the track location by the amount set in the step size parameter on the Step Entry page. This is the same as using the ***STEP*** command on that page.
- **SONG-STEP** — if a song step has been programmed with REPS=FS, each time you press the Foot Switch, the TS-12 will select the sequence that is the next step in the song.

Tip: Both the Sustain and Sostenuto pedals can be used to dynamically “latch” the current amount of pressure being exerted on the keyboard. Here's how:

- 1) Select a sound that responds to pressure. Ideally choose a sustaining sound like an oboe.
- 2) Play a key and press into the keyboard until you can hear the pressure modulation affect the sound of the note.
- 3) Press and hold the Sustain or Sostenuto pedal.
- 4) Release the key. You will hear that the sound continues to be modulated by pressure at the depth to which you were pressing.
- 5) Play a different key. Notice that the new note is *not* modulated. You can now press into the keyboard and modulate the new note independent of the note that is sustained. When the current pressure output exceeds the latched level, pressure on the new note will modulate both notes.
- 6) To release the “latched” pressure value on the sustained note, either press the “latched” key again, or release the Sustain or Sostenuto pedal.

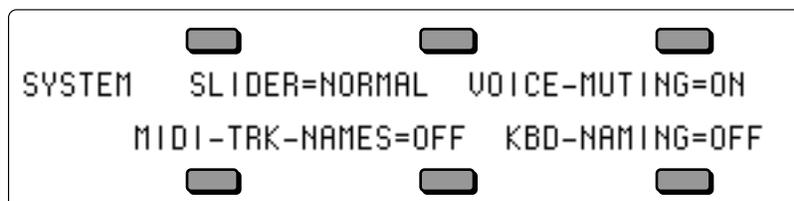
PEDAL

Range: VOL or MOD

Determines whether the optional CVP-1 foot pedal will act as a volume pedal or a modulator:

- **VOL** — will control the volume of the currently selected or stacked Track(s). Transmitted via MIDI as Controller #7.
- **MOD** — will affect any modulation destination that has PEDAL assigned as a modulation source. Transmitted via MIDI as Controller #4.

Press the **System** button again to show the third sub-page:



SLIDER

Range: NORMAL, TIMBRE, or XCTRL

Determines whether the **Data Entry Slider** will act as the Timbre or XCTRL modulator while on any Sounds or Presets bank page. This allows you to vary the Track Timbre or Track XCTRL setting of the primary selected sound without having to switch to the Timbre or XCTRL Track Parameter pages. Refer to *Section 5 — Preset/Track Parameters* for more information about the Timbre modulator.

- **NORMAL** — the **Data Entry Slider** will act normally, and will be disabled while on any Sounds or Presets bank page.
- **TIMBRE** — the **Data Entry Slider** will control the Track Timbre setting of the primary selected sound while any Sounds or Presets bank page is displayed. As a performance controller, the slider will only affect the primary sound.
- **XCTRL** — the **Data Entry Slider** will control the Track XCTRL setting of the primary selected

sound while any Sounds or Presets bank page is displayed. As a performance controller, the slider will only affect the primary sound.

Note: If you play and hold a note, modulate the sound with the Timbre or XCTRL Slider, and then select another sound, the Timbre slider will no longer affect the sound of the held note.

VOICE-MUTING

Range: OFF or ON

This parameter controls whether or not all voices currently playing will shut off when a new program or preset is selected. This lets you avoid any audible “glitch” or discontinuity as the new sound’s effect is loaded, but at the expense of being able to sustain a note from one sound while selecting and playing another.

- ON — Whenever you select a new sound or preset, any voices that might be sustaining from the previous sound will be stopped.
- OFF — When you select a new sound or preset, voices that are sustaining from previous sounds will continue to play as long as the key(s) are held down. The old voices will go through the effect of the new sound or preset, so they might sound different, especially if the new sound uses a radically different effect.

MIDI-TRK-NAMES

Range: OFF or ON

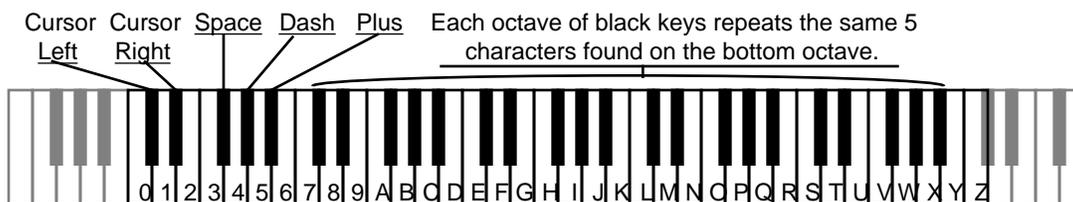
This parameter determines whether preset and sequencer tracks will show the sound name or show *MIDI-CHAN-# instead of the sound name.

- OFF — When a track’s MIDI STATUS is set to VOICE-OFF, LOCAL-OFF or MIDI-LOOP on the Track MIDI page, any displays that would normally show the track’s sound name (the Tracks 1-6 and 7-12 pages in sequence mode, and all Track Parameter pages in Presets mode) will show *MIDI-CHAN-# instead of the name. This is helpful when using the TS-12 as a MIDI controller, or when sequencing remote MIDI devices, as it shows you at a glance which tracks will play only over MIDI, and on which MIDI channels.
- ON — The track’s sound name will always appear on the Tracks 1-6 and 7-12 pages (in Sequencer Mode), and the Track Parameter pages (in Presets mode), no matter what the track’s MIDI STATUS is set to.

KBD-NAMING

Range: OFF or ON

When this switch is ON, the keyboard can be used for name data entry. Whenever a naming field is active, pressing a key on the keyboard will enter the character assigned to that key, or move the cursor. The 36 white keys are the digits 0..9 and letters A..Z, while the black keys provide a repeating set consisting of cursor left, cursor right, and 3 punctuation marks (space, dash, and plus). Period, slash and star are only available using the **Data Entry Slider** or the **Up/Down Arrow** buttons



When KBD-NAMING=OFF, the characters on naming pages will be affected only by the Data Entry Controls and the Cursor Left/Right soft buttons.

Press the **System** button again to show the third sub-page:



PITCH-TABLE

Range: NORMAL, CUSTOM, U1-PROGRAMS, ROM

This parameter allows you to set the system pitch-table to either a NORMAL (western 12-tone equal-temperament) or a CUSTOM (user-definable) pitch-table and affects all voices that have been programmed to use the SYSTEM pitch-table. For more information on pitch-tables, please refer to *Section 8 — Understanding Programs*.

- **NORMAL** — the TS-12 will use the western 12-tone equal-temperament tuning instead of the custom system pitch-table. Setting the System pitch-table to NORMAL does *not* affect the custom pitch-table.
- **CUSTOM** — the system pitch-table is set to a user-definable tuning. This is installed by creating a pitch-table in a program, and using the Copy function to copy it into the System. This is useful when you have one alternate tuning scheme that you want to use for many sounds.
- **U1-PROGRAMS** — This setting enables dynamic Pitch-Table Selection, allowing you to easily switch between different system pitch-tables in performance situations. When PITCH-TABLE=U1-PROGRAMS you can instantly load new CUSTOM system pitch-tables without affecting the sound you are playing by selecting pitch-table programs loaded into BankSet U1. This allows you to change the tuning while playing, without having to select a different sound.

In order for this feature to work correctly, you must set the system pitch-table switch to PITCH-TABLE=U1-PROGRAMS on the System page before “selecting” a new pitch-table program. If the program you indicate contains a valid pitch-table, it will be installed into the CUSTOM System pitch-table, and you will immediately hear the new tuning. If it does not, nothing will happen. In either case there will be no visible indication of your action. The program name will not be underlined when you “select” it, which is a good indication that you are using a pitch-table from a program in BankSet U1.

You may save programs (with or without pitch-tables) onto BankSet U1 in the normal way. It is suggested that you name programs that are to be used to install pitch-tables with names that describe the pitch-table they contain. For example, naming a program PT-PYTHA-F describes it as follows: PT for pitch-table program; PYTHA for Pythagorean tuning; and F for the tone center. This naming scheme is useful in making pitch-table programs easily recognizable.

In MIDI reception modes OMNI, POLY, and MONO A, incoming MIDI program changes 0 to 59 will select pitch-tables from BankSet U1, if PITCH-TABLE=U1-PROGRAMS on the System page. For more information about the MIDI MODE parameter, see *Section 3 — MIDI Control Page Parameters*.

Tip: When this parameter is selected (underlined), you can move the Data Entry Controls in real-time to change the pitch -tables while the sequencer is playing. This can create some interesting and fun effects.

Various ROM System Pitch-Tables

By using the data entry controls, you can select from a large assortment of traditional, modern, ethnic, and exotic pitch-tables for use as the System pitch-table. These ROM pitch-tables are:

- **PYTHAGRAN-C** — Early tuning derived by calculating 12 perfect fifths and adjusting the octaves downward as necessary. Leaves all fifths except the one between G# and D# very pure. The entire mathematical anomaly encountered by tuning up 12 perfect fifths (called the Pythagorean comma) is accounted for in the interval between G# and D#.
- **JUST INT-C** — Designed so that the major intervals in any scale are very pure, especially the third and fifth.
- **MEANTONE-C** — One of the earliest attempts to derive a tuning which would accommodate music played in a variety of keys. The major third interval is very pure.
- **WRKMEISTR-C** — Derived by Andreas Werkmeister, a contemporary of Bach, this is a further attempt to create a temperament which would accommodate music played in any key.
- **VALLOTTI-C** — A variation of Pythagorean tuning in which the first 6 fifths in the circle of fifths are flat by 1/6 of the Pythagorean Comma. This is probably close to the tuning used by Bach for his Well-Tempered Clavier.
- **GRK-DIATONC** — The basic building block of ancient Greek music (in which most modern western music has its roots) was the tetra chord - four notes and three intervals spanning a perfect fourth. The placement of the two inner notes of the tetra chord determined its genus - diatonic, chromatic or enharmonic. This pitch-table is derived from two diatonic tetra chords, combined to form a seven-note scale similar to the modern diatonic scale. It is to be played only on the white keys. Tone center is E.
- **GRK-CHROMAT** — This pitch-table is derived from two chromatic tetra chords (the intervals are, roughly, quarter-tone, half-step, major third), combined to form a seven-note scale. It is meant to be played on the white keys. Tone center is E.
- **GRK-ENHARM** — This pitch-table is derived from two enharmonic tetra chords (the intervals are, more or less, two quarter-tones followed by a major third), combined to form a seven-note scale. It is meant to be played on the white keys. Tone center is E.
- **TURKISH-A** — This is a typical Turkish octave-based scale using only one quarter tone. The second note in the scale is tuned 40 cents flat from the equal-tempered equivalent; in this tuning B is 40 cents flatter from B natural. The scale rises from A.
- **ARABIC-1** — The intervals in this table form the basis for much Middle Eastern music. Here the octave is divided into 17 intervals, corresponding to the fret intervals of some stringed instruments used in this area. The scale rises from the base pitch of C4 in a series of three repeating intervals (in cents) of 90, 90, 24; and so on. From C4 to F5 represents an octave.
- **ARABIC-2** — Similar to Arabic 1, except that here the octave is divided into 24 intervals. This makes one pitch octave cover two keyboard octaves, meaning that the fingering will be the same in any octave. This scale rises from the base pitch of C4 in a series of four repeating intervals (in cents) of 24, 66, 24, 90; and so on.
- **ARABIC-3** — This is a 12-tone scale using quarter tones (notes tuned sharp or flat by 50 cents from their equal-tempered equivalents) on the C#, E, G# and B keys.
- **ARABIC-4** — Another octave-based scale with an Arabic flavor. In this case the “quarter tones” are not perfectly equal, imparting a distinctive character to the notes.

- **JAVA-PELOG1** — One of the two main scales of the gamelan orchestras of Java and Bali is the seven-tone scale called Pelog. The notes C, D, F, G, and A (which are reproduced on the black keys) are considered primary, with E and B used for grace notes. The octaves are stretched (tuned a little sharp) due to the harmonic content of the instruments in the gamelan. (Note that there are many subtle variations of these tunings, almost as many as there are gamelan ensembles. The tunings we have included here are to be considered typical, not definitive.)
- **JAVA-PELOG2** — This is another version of the seven-tone Pelog scale used in gamelan music. The notes C, D, F, G, and A (which are reproduced on the black keys) are considered primary, with E and B used for grace notes. The octaves are stretched (tuned a little sharp) due to the harmonic content of the instruments in the gamelan.
- **JAVA-PELOG3** — A third version of the seven-tone Pelog scale used in gamelan music. The notes C, D, F, G, and A (which are reproduced on the black keys) are considered primary, with E and B used for grace notes.
- **JAVA-SLNDRO** — This is a 15-tone equal tempered tuning from Java. Playing every third note (as in a diminished chord) yields a typical 5-tone scale of the gamelan. Other notes can be used as passing tones.
- **JAVA-COMBI** — This is actually two pitch-tables in one. The white keys play the seven-tone Pelog scale, same as the table JAVA-PELOG1. The black keys play a five-tone scale called Slendro, which is close to a five-tone equi-tempered scale. Both tunings have their octaves stretched (tuned a little sharp) due to the harmonic content of the instruments in the gamelan.
- **INDIAN-RAGA** — Indian scale used to play ragas, based on 22 pure intervals called Srutis. This pitch-table uses two keyboard octaves to play one octave in pitch. The 22 Srutis are mapped to keys in this two octave range omitting the A#s, which play the same pitch as the adjacent A.
- **TIBETAN** — This tuning is based on a pentatonic scale from Tibet. Notice that playing the black keys yields a scale similar to the 5-tone Slendro tuning from Indonesia.
- **CHINESE-1** — This is a seven-tone scale used widely in China. It is meant to be played on the white keys.
- **CHINESE-2** — This is a seven-tone scale based on an ancient Chinese lute tuning. It is meant to be played on the white keys.
- **THAILAND** — This is a seven-tone equi-tempered scale from Thailand. It is meant to be played on the white keys.
- **24-TONE-EQU** — Centered on C4, this scale has an even quarter tone (50 cents) between each keyboard note, and each pitch octave covers 2 keyboard octaves. This tuning has been used by many contemporary composers and can be used in some Middle Eastern music.
- **19-TONE-EQU** — Centered on C4, this scale divides the octave into 19 equal steps. From C4 to G5 forms an octave. This scale yields very pure thirds and sixths, but not fifths. Like the 24-tone scale, this has been used by some modern composers.
- **31-TONE-EQU** — Centered on C4, this scale divides the octave into 31 equal steps. From C4 to G6 forms an octave. Similar to 19-tone in the purity of its intervals.
- **53-TONE-EQU** — This scale divides the octave into 53 equal steps. From C2 to F6 forms an octave. It yields very pure thirds, fourths and fifths.

- **HARMONIC-C** — This is a mathematically generated scale based on the relationships of the partials in the harmonics of the fifth octave of the linear harmonic spectrum. It is interesting mostly from a theoretical standpoint.
- **CARLOSALPHA** — The first of three scales derived mathematically by Wendy Carlos in the search for scales with the maximum purity of primary intervals, Alpha is based on the division of the octave into 15.385 equal steps (78 cents per key). One pitch “octave” covers 16 keys, though because the Carlos scales are asymmetric (not based on whole number divisions of the octave) they do not yield pure octaves.
- **CARLOS-BETA** — Wendy Carlos' Beta scale is based on the division of the octave into 18.809 equal steps (63.8 cents per key). One pitch “octave” covers 19 keys, though, again, being asymmetric it yields no pure octaves.
- **CARLOSGAMMA** — Wendy Carlos' Gamma scale is based on the division of the octave into 34.188 equal steps (35.1 cents per key). This scale has essentially perfect major thirds, fourths and fifths. One pitch “octave” covers 35 keys, though, again, being asymmetric it yields no pure octaves.
- **PARTCH-43** — Harry Partch was a pioneer of micro tonality in the early 20th century. He developed this 43-tone-per-octave scale of pure intervals, and even designed an entire orchestra of instruments for music using this scale. The tonal center is found on key D2 (the low D on the 61-note keyboard). This pitch-table has been transposed up an octave to bring the notes into a more usable range.
- **REVERSE** — This pitch-table simple reverses the pitch-tracking of the keyboard, putting the highest notes at the bottom of the keyboard and the highest notes at the top. Lots of fun.

Selecting ROM Pitch-Tables

Here's how to select and use the Internal ROM pitch-tables:

- 1) Start by selecting a sound from the internal memory of the TS-12. We recommend using a piano, organ, or guitar sound. Do not select a drum kit or percussion sound, as these sounds use the TS-12 Drum-Map and will not respond to pitch-tables.
- 2) Once you have found a sound you like, press the **System** button four times. The display will read **SYSTEM PITCH-TABLE=NORMAL**. The **NORMAL** pitch-table is the default pitch-table of the TS-12 and is known as the western twelve tone equal-tempered tuning. Play a scale on the keyboard and listen to the pitch of each note.
- 3) Press the **Up Arrow** button three times to display the first ROM pitch-table (**PYTHAGRAN-C**) and play the keyboard. Notice that the TS-12 is now using an alternate tuning. The first several ROM pitch-tables will make subtle changes in tuning, while the remainder of the ROM pitch-tables will have a more obvious affect.
- 4) Press the **Up Arrow** button again and play the keyboard. Continue scrolling through the remaining pitch-tables and listen to the tuning variations offered.

If you would like to continue using a particular pitch-table with other sounds, press the **Sounds** button to return to the TS-12's internal sound banks. The currently selected System pitch-table will remain in affect even after turning the TS-12 power off and back on. In this way, if your music requires the same pitch-table all the time, you can simply turn on the TS-12 and start playing.

Using the U1-Programs Pitch-Tables

Note: You will need the TSD-100 floppy disk that was included with the TS-12 to complete the following exercise. This disk contains two files of pitch-tables. They are stored as 60-PROGRAMS file types. The first pitch-table file is called HIST PTABLS and contains five different Historical pitch-tables with twelve root key versions of each scale. The second file is called ETH/MOD PTS and contains a variety of Ethnic and Modern pitch-tables:

- Insert the TSD-100 floppy disk into the disk drive and press the **Storage** button twice.

Tip: Pressing the **Storage** button twice will automatically take you to the Disk Load Page.

- Press the **Up** or **Down Arrow** button until the display reads TYPE=60-PROGRAMS.
- Press the upper left soft button above the words LOAD FILE=_____. Using the **Up** or **Down Arrow** button, find the file named ETH/MOD PTS.
- Press the bottom middle soft button beneath the words BANKSET U0, and press the **Up Arrow** button once so the display reads BANKSET U1.
- Press the upper right soft button above the word *YES*. This will load 60 new pitch-table Programs into User RAM BankSet 1.

When the file has been loaded, the display will show DISK COMMAND COMPLETED.

- Press the **System** button four times until the display reads SYSTEM PITCH-TABLE=<last selected pitch-table>. Press the **Up** or **Down Arrow** button to set this value to PITCH-TABLE=U1-PROGRAMS.
- Press the **Sounds** button and select a sound of your choice from any BankSet other than BankSet U1.
- While holding down the **BankSet** button, press the **Bank 1** button, then release both buttons. You have now selected User RAM BankSet U1.

Note: At this point when you select locations in BankSet U1, you will be selecting from 60 pitch-tables instead of 60 Programs. The Programs that were originally stored in BankSet U1 have been replaced by the newly loaded pitch-table file.

- Press the **Bank 0** button and then press the upper left soft button. Play the keyboard. This selects the first of the 60 pitch-tables that are instantaneously available.

Try the other pitch-tables in Bank 0 by pressing the other soft buttons. Continue by selecting pitch-tables in Banks 1 through 9. Each Bank contains six pitch-tables.

Using the above procedure, you can load the file named HIST PTABLS to try more pitch-tables.

Loading a full set of 60 pitch-tables into the TS-12 internal memory in this way gives you the ability to select a variety of keyboard tunings in real-time while in the middle of a performance! Pitch-tables can even be remotely selected via incoming MIDI Program Changes.

PRESS-MODE Range: CHAN or PSET

This parameter determines the default Track Pressure setting for sounds as they are selected in Sounds mode, or as they are assigned to a Track using the Replace Track Sound function in Presets or Seqs/Songs. It also determines the default Track Pressure mode for all three Preset Tracks when a Preset is selected. When PRESS-MODE=CHAN, all Sounds and Preset Tracks that are set to KEY will have their Track Pressure mode automatically set to CHAN; Sounds and Preset Tracks that have their Pressure mode set to OFF will be unaffected. The PRESS-MODE=PSET setting disables this function, and installs the Sound and Preset Track Pressure settings as stored in the Sounds or Presets.

The TS-12's keyboard generates Channel pressure (Track PRESSURE=CHAN), but Sounds and Presets can be programmed so that they respond to Poly-Key pressure via incoming MIDI (Track PRESSURE=KEY). However, when Track PRESSURE=KEY, the sounds will not respond to the Channel pressure generated by the TS-10's own keyboard. The PRESS-MODE parameter automatically compensates for this when PRESS-MODE=CHAN, ensuring that sounds created with Poly-Key pressure will respond to Channel pressure generated by the TS-12's keyboard.

WAKE-UP-MODE Range: SOUNDS, PRESETS, SEQ/SONG, DEFAULT, PREVIOUS, LASTPAGE, GEN-MIDI

This parameter determines which mode the TS-12 will “wake-up” in after power-on.

- SOUNDS — Power-on in Sounds mode with the last Sound selected before power-off selected.
- PRESETS — Power-on in Presets mode with the last Preset selected before power-off selected.
- SEQ/SONG — Power-on in Sequencer mode with the last Sequence or Song selected.
- DEFAULT — Power-on in Sounds mode showing Program Bank U0-0. The default sound in ROM will be selected.
- PREVIOUS — Power-on in the same mode the TS-12 was in when it was powered-off. Note that if the TS-12 was in General MIDI mode when it was powered-off, it will wake-up in Sounds mode.
- LASTPAGE — Power-on showing the last page that the TS-12 was on when it was powered-off. This does not apply to some editing sub-pages. Note that if the TS-12 was in General MIDI mode when it was powered-off, it will wake-up showing the last page that the TS-12 was on *before* entering General MIDI mode.
- GEN-MIDI — Power-on in General MIDI mode.

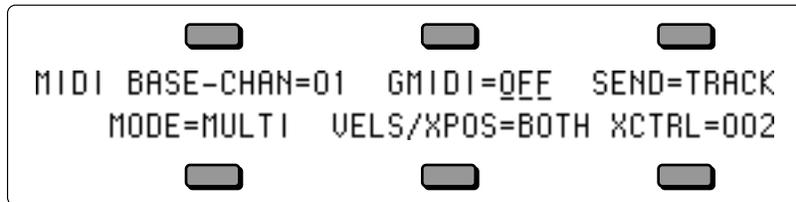
Note: When WAKE-UP-MODE=GEN-MIDI, and Sampled Sounds had previously been loaded, the Auto-Load prompt will be displayed before the TS-12 enters General MIDI. To prevent this, you can first erase all Sampled Sounds from memory, as described in *Section 14 — Understanding Sampled Sounds*.

Section 3 — MIDI Control Page Parameters

These parameters set instrument wide MIDI parameters, such as the Base Channel number and MIDI Reception mode, and control what types of MIDI messages are received and transmitted. The settings of these parameters will remain in effect at all times and are preserved while the power is off. The MIDI Control Page has three sub-pages. This section also offers an introduction and overview of General MIDI, and explains how to use it with the TS-12.

Whether you are simply linking two keyboards together, playing a synth from a guitar controller, or driving a rack of samplers from the TS-12, MIDI makes it all possible.

- Press the **MIDI Control** button. This takes you to the top level MIDI Control Page:



BASE-CHAN

Range: 01 to 16

Selects the Base Channel on which the TS-12 transmits and receives MIDI messages. System Exclusive messages are always sent and received on the base channel.

Any of 16 MIDI channels may be selected as the basic MIDI channel of the TS-12. The effect of setting the base channel varies depending on the MIDI Mode and whether data is being sent or received.

Transmit If SEND=BASE, then the TS-12 only transmits keys, controllers, and program changes on the base channel. If SEND=TRACK, then keys, controllers, and program changes are transmitted on the channel defined in the preset or sequencer track.

Receive In Poly mode — keys, controllers, and program changes are only recognized if received on the base channel. In Mono A mode, program changes are received only on the base channel. The base channel is also used in both Mono modes as the first channel of the 12 channel range.

GMIDI

Range: OFF or ON

This is used to enter General MIDI mode. The TS-12 completely conforms to the full General MIDI Specification. This allows you to play back any General MIDI-based sequence via incoming MIDI and always get predictable results. The General MIDI Sounds in ROM (listed later) are also provided on the in-box disk (TSD-300) that came with your TS-12.

For a complete description of this mode, see *Section 12 — Sequencing/MIDI Applications*.

SEND

Range: BASE or TRACK

Controls the MIDI channel on which the TS-12 will transmit performance information such as key and controller events, as well as program changes.

- **BASE** — The TS-12 will transmit *only* on the Base Channel, and will ignore the channel assignments contained in the tracks. When Presets are selected, they will transmit the MIDI Program Change for the Preset, and not the Program Change values for the three Tracks.
- **TRACK** — The settings on the Track MIDI page determine the MIDI transmission channel. The TS-12 will transmit on the channel(s) assigned to the track(s) being played, either from the keyboard or the sequencer, depending on the Track MIDI Status (i.e. nothing will be sent if a track is assigned to the - - - /RECV or MIDI-OFF status). Each track can have its own MIDI channel.

Note: When a Sequence or Song Track is selected, SEND will automatically be set to TRACK. Sequence and Song Tracks *always* transmit on their Track MIDI Channel.

MODE Range: OMNI, POLY, MULTI, MONO-A, or MONO-B
This parameter determines how MIDI information will be *received* by the TS-12. MODE has no effect on what MIDI information is transmitted.

There are five MIDI modes implemented in the TS-12:

- **OMNI** — In this mode, the TS-12 will receive on any or all of the 16 MIDI channels. This mode is useful when you are only using a few instruments, and you are not concerned with setting up different channels for each device.
- **POLY** — In this mode, the TS-12 will receive only on the Base MIDI channel. MIDI information on all other channels will be ignored.
- **MULTI** — An ENSONIQ innovation, MULTI mode is the key to unlocking the potential of the TS-12 as a multi-timbral receiver from an external MIDI sequencer. In MULTI mode, the 12 Tracks of the current song or sequence can receive MIDI information independently and polyphonically on up to 12 different MIDI channels. The Preset Tracks will not receive incoming MIDI in MULTI mode.

In MULTI mode, different MIDI channels must be selected for each Sequence Track that you want to receive via MIDI. This can be accomplished on the Track MIDI page. If more than one Sequence Track is set to the same MIDI channel, only the lowest numbered track will receive via MIDI.

In MULTI mode, independent of what tracks are stacked or selected on the front panel, the sounds you hear will depend entirely on what MIDI channel(s) the MIDI data is received on.

About Mono Mode

Mono mode is particularly useful for driving the TS-12 from a guitar controller, or any other application where having up to twelve independent, monophonic channels is desirable. The TS-12 offers two types of Mono mode operation. In both types, the TS-12 will receive monophonically on twelve consecutive MIDI channels (the Base channel through Base channel +11). The difference has to do with how those MIDI channels are routed within the TS-12.

- **MONO-A** — This is another ENSONIQ development intended to make using multi-channel controllers like guitars easier. All notes and controllers received via MIDI will play whatever sounds are selected or stacked on the front panel, just as if the notes were played from the keyboard. You have the advantage of multiple tracks which will respond independently to controllers received on multiple channels, but you do not have to set up the sounds for each track separately.
- **MONO-B** — This is the more conventional type of Mono mode. It allows you to set up each track of the current song or sequence as a monophonic synthesizer. Each track can have a different sound assigned to it. This is how you get a different sound on each string when using a MIDI guitar controller.

Global Controllers in Mono Mode

Global controllers are controllers sent on one channel that affect all other channels simultaneously. They can be useful in reducing the number of MIDI events required to achieve particular effects, and can thereby reduce the delays sometimes associated with overloading MIDI. Some guitar controllers can transmit global controllers, and the TS-12 can respond to them.

In Mono mode (A or B) the base channel minus one becomes the MIDI channel for global controllers (pitch bend, pressure, etc.). For example, if the base channel is channel 3, any controllers received on channel 2 will be interpreted as global controllers and will affect *all* voices being played. If the base channel is channel 1, channel 16 becomes the channel for global controllers. Each track will also respond independently to controllers sent on its own channel. For example, each guitar string on a MIDI guitar can send independent pitch bend, while the “whammy bar” controller could be sent on the global channel to affect all voices.

VELS/XPOS — MIDI Transpose Enable Range: SEND, RECV, or BOTH

Controls whether track transpose will affect the transmission/reception of MIDI key numbers, giving you more control over how the Track Parameter TRANSPOSE function will affect notes played on a track.

XPOS also controls how the Track VELS setting will affect MIDI transmission/reception of velocity, in accordance with the same rules that govern the Track TRANSPOSE parameter.

- **SEND** — Will transmit the transposed key numbers of a track, but notes received via incoming MIDI will not be transposed. This setting is useful for sending transposed key numbers to an external MIDI device, without affecting the pitch of notes received via incoming MIDI.
- **RECV** — The key number transmitted by the TS-12 will always be the same key that was actually played on the TS-12 keyboard, but notes received via incoming MIDI will be transposed. In this mode, the TS-12 will respond properly when transposed data sent to an external sequencer is transmitted back to the TS-12.
- **BOTH** — Will transmit and receive the transposed key numbers of a track. Useful for sending transposed key numbers to an external MIDI device, while also affecting the pitch of notes received via incoming MIDI.

Setting	Local Voices Affected	MIDI Reception Affected	MIDI Transmission Affected
SEND	Yes	No	Yes
RECV	Yes	Yes	No
BOTH	Yes	Yes	Yes

XCTRL - External Controller Range: 000 to 127

Use XCTRL to assign an external MIDI Controller number to be both transmitted and received by the TS-12. The number that is assigned here will be used as the MIDI Controller number that the XCTRL Track parameter will transmit on.

Most controllers on a synthesizer—mod wheel, channel pressure, or breath controller for example—have a MIDI controller number associated with them: this parameter can be set to match the MIDI Controller number of any controller in your rig. Doing so will make a particular external controller available as a modulator in any of your sounds.

One of the modulation sources that can be selected in the programming section is XCTRL. The value of the XCTRL parameter is a MIDI controller number, ranging from 000 to 127. When the Track XCTRL value is edited, parameters that have XCTRL assigned as a mod source will be modulated, and the TS-12 will transmit the edited value(s) on the MIDI Controller number assigned to this parameter. When the TS-12 receives MIDI Controller messages corresponding to this controller number, they will be routed to *all* parameters that have been programmed with XCTRL as a modulation source.

Suppose for example, you are playing the TS-12 from a keyboard with a breath controller (or want to use a breath controller as a modulator when playing the TS-12 keyboard). You can set up a program on the TS-12 in which the filter cutoff frequency is modulated by XCTRL. If you then set XCTRL=02, the breath controller will now be able to modulate the filter, or whatever else has its modulation source set to XCTRL, in the program you have created.

The following controller numbers are commonly supported:

Number	Controller	Number	Controller
1	Modulation Wheel	64	Sustain
2	Breath Controller	66	Sostenuto
4	Foot Pedal	70	Sound Variation (Patch Selects)
6	Data Entry MSB	71	Harmonic Content (Timbre)
7	Volume	72	Release Time
10	Pan	73	Attack Time
12	Effect Modulation	74	Brightness

- Press **MIDI Control** again. The display shows the second sub-page:



LOOP

Range: OFF or ON

The MIDI LOOP parameter controls how volume information is handled when a track's status is set to LOCAL-OFF or MIDI-LOOP. It controls whether or not the Track MIX parameter, as adjusted in the Track Parameter section, will transmit via MIDI. It only affects tracks that have their MIDI status set to LOCAL-OFF or MIDI-LOOP. It is normally OFF, but in a MIDI loop setup, it should be ON.

- OFF — This is the default setting. When changes are made to the Track MIX parameter (on tracks with STATUS=LOCAL-OFF or MIDI-LOOP), or when the volume pedal is moved, the TS-12 will transmit MIDI volume (controller 7) messages that combine the Track MIX setting with the current setting of the volume pedal.
- ON — The TS-12 will *not* transmit changes made to the Track MIX parameter on tracks with STATUS=LOCAL-OFF or MIDI-LOOP. Volume pedal changes will be transmitted directly and are unaffected by the MIX setting.

When LOOP=OFF, then the MIX parameter is combined (multiplied) with the volume pedal setting to create a composite volume, which is then transmitted to external sound modules as MIDI controller 7. In a MIDI loop situation with a computer, this is undesirable, because lowering the MIX value will send controller messages that are indistinguishable from volume pedal messages. When this information is echoed by the computer, the TS-12 receives it as volume pedal, lowering the volume on that track even further. Eventually this causes the volume to spiral down to zero, which in turn causes the track to be silenced, even though the displayed volume setting is greater than zero. Setting LOOP=ON will prevent this problem from occurring.

Note that the volume pedal is only active if PEDAL=VOL on the System page, and that volume pedal changes will always be transmitted as MIDI volume (controller 7).

Working with MIDI Loops

With a MIDI loop setup, the MIDI Out of the TS-12 is either directly or indirectly (through an external device such as a computer) connected to the MIDI In of the TS-12. The MIDI-LOOP Track STATUS is optimized for use in a MIDI loop in which the TS-12 will play back into itself.

Do not use the SEND/RECV Track STATUS setting with a MIDI loop present. To connect a TS-12 track to a computer sequencer, the MIDI-LOOP setting should be used. In this type of setup, a computer in MIDI Thru mode forms a loop which echoes the MIDI information back into the TS-12. See Section 5 — Preset/Track Parameters for more information about the Track MIDI STATUS parameter. See Section 10 — Understanding the Sequencer for information on recording into the TS-12 sequencer in a MIDI loop.

Using Presets with MIDI Loops

Tip: For best results, set SEND=BASE and MODE=POLY on the MIDI Control page. Be aware that when you select a new preset, program changes with the preset's number are transmitted via MIDI; Program changes are not transmitted from the individual tracks in the preset. Receiving from MIDI while on a Preset bank page or Preset Track parameter page will minimize problems.

CNTRLS — Controllers

Range: OFF or ON

This switch controls whether or not the TS-12 will transmit and receive MIDI controllers — pitch bend, mod wheel, pressure, volume, sustain pedal, etc.

SONG-SEL — Song Select

Range: OFF or ON

This determines whether the TS-12 will send and receive MIDI Song Select messages.

- OFF — The TS-12 will not transmit MIDI Song Select messages, and will ignore incoming Song Select messages received via MIDI.
- ON — Incoming Song Selects will select the corresponding TS-12 sequencer location. Incoming MIDI Song Selects # 00-59 will select TS-12 Sequencer locations # 00-59. Selecting Sequencer locations # 00-59 will always cause the TS-12 to transmit MIDI Song selects # 00-59.

ALL-OFF

Range: OFF or ON

The All Notes Off message enable switch controls how the system will react to MIDI All Notes Off messages received on any MIDI channel.

- OFF — The TS-12 will ignore any All Notes Off messages that are received.
- ON — The TS-12 will shut down all currently sounding internal voices unless the MODE parameter is set to OMNI, in which case the message is ignored.

START/STOP

Range: OFF or ON

This parameter determines whether pressing the **Play** and **Stop/Continue** buttons will transmit MIDI Start, Stop and Continue messages from the TS-12 MIDI Out port. The TS-12 will always receive Play Stop, and Continue messages via MIDI, regardless of the setting of this parameter, if CLOCK=MIDI on the Sequencer Control page. Some older drum machines have no way of disabling reception of these messages, and will always start playing their internal patterns when they receive a Start message. Set this parameter to OFF when you want to use such a drum machine simply as a voice module, played from a TS-12 sequencer track, without starting its internal sequencer playing each time you press the **Play** button on the TS-12.

- ON — When you press the **Play** or **Stop/Continue** buttons to start, stop or continue the TS-12 sequencer, a corresponding MIDI Start, Stop or Continue message will be sent.
- OFF — When you press the **Play** or **Stop/Continue** buttons to start, stop or continue the TS-12 sequencer, a MIDI Start, Stop or Continue message will *not* be sent.

PROG-CHG — Program Changes Range: OFF or ON

This switch controls how the TS-12 handles transmission and reception of MIDI program change messages.

- **OFF**—the TS-12 will *not* transmit or receive MIDI program changes.
- **ON**—the TS-12 will transmit and receive program changes over MIDI.
- **NEW**—the TS-12 will transmit program changes only if they are *different* than the previous program change sent out on the particular channel. Program changes will be received normally.

Refer to the Track MIDI parameter description in *Section 5 — Preset/Track Parameters* and *Section 10 — Understanding the Sequencer* for more information on how program changes are handled.

Receiving MIDI Program Changes

The way in which the TS-12 receives program changes is slightly more complex than some other systems, because of the large number of programs and presets that are available to be selected from MIDI program changes. The following chart shows how the TS-12 receives MIDI program changes:

In OMNI, POLY and MONO-A modes (puts unit into Sounds/Presets mode):

When...	Incoming MIDI Program Changes...	Will Select...
BankSet U0 is selected	00-59	User RAM Programs 00-59
BankSet U1 is selected	00-59	User RAM Programs 00-59
BankSet R2 is selected	00-59	ROM Programs 00-59
BankSet R3 is selected	00-59	ROM Programs 00-59
BankSet R4 is selected	00-59	ROM Programs 00-59
BankSet S8 is selected	0-9	Sampled Sounds 0-9
BankSet S9 is selected	0-9	Sampled Sounds 0-9
BankSet U0 is selected	60-119	User RAM Presets 00-59
BankSet U1 is selected	60-119	User RAM Presets 00-59
BankSet R2 is selected	60-119	ROM Presets 00-59
BankSet R3 is selected	60-119	ROM Presets 00-59
BankSet R4 is selected	60-119	ROM Presets 00-59
BankSet S8 is selected	10-127	nothing...
BankSet S9 is selected	10-127	nothing...

In MULTI and MONO-B modes (received on Seq/Song Tracks only):

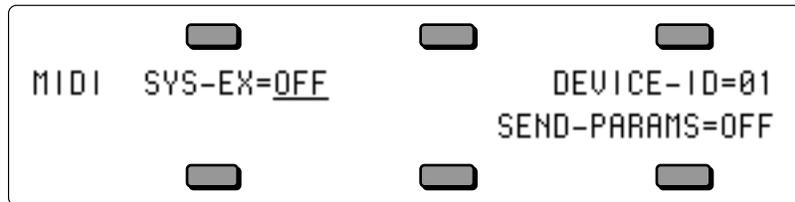
When...	Incoming MIDI Program Changes...	Will Select...
Track BANK=000 (BankSet U0)	00-59 (without FX)	User RAM Programs 00-59
Track BANK=001 (BankSet U1)	00-59 (without FX)	User RAM Programs 00-59
Track BANK=002 (BankSet R2)	00-59 (without FX)	ROM Programs 00-59
Track BANK=003 (BankSet R3)	00-59 (without FX)	ROM Programs 00-59
Track BANK=004 (BankSet R4)	00-59 (without FX)	ROM Programs 00-59
Track BANK=008 (BankSet S8)	0-9 (without FX)	Sampled Sounds 0-9
Track BANK=009 (BankSet S9)	0-9 (without FX)	Sampled Sounds 0-9
Track BANK=000 (BankSet U0)	60-119 (with FX)	User RAM Programs 00-59
Track BANK=001 (BankSet U1)	60-119 (with FX)	User RAM Programs 00-59
Track BANK=002 (BankSet R2)	60-119 (with FX)	ROM Programs 00-59
Track BANK=003 (BankSet R3)	60-119 (with FX)	ROM Programs 00-59
Track BANK=004 (BankSet R4)	60-119 (with FX)	ROM Programs 00-59
Track BANK=008 (BankSet S8)	60-69 (with FX)	Sampled Sounds 0-9
Track BANK=009 (BankSet S9)	60-69 (with FX)	Sampled Sounds 0-9

Note: Incoming MIDI Bank Select messages 0 thru 9 will select BankSets 0 thru 9, changing which Programs will be selected by incoming MIDI Program Changes. In all cases Program Change numbers above 120 to 127 are ignored.

Selecting a New Sequence or Song Effect from MIDI Program Changes

As indicated in the above chart, in MULTI and MONO-B modes, adding 60 to the MIDI Program Change number for the desired sound will select the new sound and also install the effect from that sound into the sequence (or song) effect. This can be useful when controlling the TS-12 from an external sequencer. Note that changing the effect will briefly silence the audio output and will cut off any sounding voices if VOICE-MUTING=ON on the System page.

- Press **MIDI Control** again. The display shows the third sub-page:



SYS-EX

Range: OFF, ON, or OLD

This switch determines whether the TS-12 is able to receive incoming MIDI System Exclusive messages:

- When SYS-EX=OFF, the TS-12 is not able to receive any MIDI System Exclusive messages.
- When SYS-EX=ON, the TS-12 will receive MIDI System Exclusive messages in the post-2.0 SYS-EX data format.
- When SYS-EX=OLD, the TS-12 will receive MIDI System Exclusive messages in both the pre-2.0 SYS-EX data format, and the post-2.0 SYS-EX data format. The OLD setting allows data saved from pre-2.0 software to be loaded into the TS-12.

The Sys-Ex Dump messages that are sent from the Storage, Sys-Ex, Send Dump pages can always be transmitted regardless of the setting of this switch. (Refer to the *Appendix* for more information about the TS-12's Sys-Ex implementation).

DEVICE-ID

Range: 01 to 16

Allows Remote MIDI Devices to address the TS-12 via incoming MIDI Sys-Ex without changing the base channel number. Think of this parameter as a higher level of identification. This is also used to identify Sys-Ex messages transmitted by the TS-12.

SEND-PARAMS

Range: OFF or ON

When SEND-PARAMS=ON, the TS-12 allows the transmission of parameter values via Sys-Ex messages. When OFF, there is no transmission of parameter values. For example, if you are editing a sound, set this parameter to OFF, to prevent a stream of MIDI Sys-EX information from flowing between the TS-12 and any connected Remote MIDI Devices.

Section 4 — Understanding Presets

This section offers a basic overview of the concepts involved in selecting, creating, editing, and understanding TS-12 Presets. For more detailed descriptions of the actual parameters, refer to Section 5—Preset/Track Parameters.

What is a Preset?

A *Preset* is a combination of three sounds and an effects set-up that can be instantly recalled for use in performance. Presets are handy “performance memories” which allow you to create and save sound combinations, splits, layers, patch select variations, etc.

The three sounds in a preset reside on three *Tracks*. For each of these three tracks, the TS-12 remembers:

- which sound is assigned to the track
- whether or not the sound is selected or layered
- the values of all the *Track* parameters for that track

A preset also has one Effects algorithm which is common to all three tracks.

The most common context for the TS-12 to be in is *Preset mode*. Unless the TS-12 is in Sequencer mode, you may assume that you are in a preset. Aside from the presets that are saved, there is a *preset buffer* that is always active. A preset buffer is a kind of storage location that is used to temporarily store information.

Whenever you select, layer or edit the Track Parameters for a sound, you are working within the preset buffer. The information in the preset buffer is temporary until you save it into one of the internal preset locations, and then it becomes permanent (it can be recalled). The track parameters of the preset, including mix, pan, transpose, etc. are always active and you should make sure that their settings are correct if you think that your programs are behaving strangely. Whenever you select a new sound from the Sound Bank pages, the track parameters are reset to their standard default settings. If you wish to change a program without resetting these parameters, use the Replace Track Sound feature described later in this section.

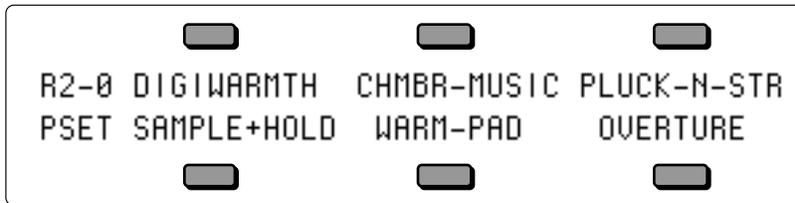
What is the Difference between Preset Mode and Sequencer Mode?

There are three Tracks in a “normal” preset and twelve tracks in a sequence or song. A sequence or song, in addition to its ability to record data on its tracks, can be thought of as a giant twelve-track “preset.” However, this giant “preset” is not available simultaneously with normal three-track presets. The twelve tracks of a sequence or song are available from the keyboard only while in Sequencer mode — indicated by the LED above either **Seq/Song Tracks 1-6** or **7-12** button being on. The twelve sequence or song tracks are always playable via incoming MIDI when the MIDI mode is set to MULTI (on the MIDI Control page).

Selecting Presets

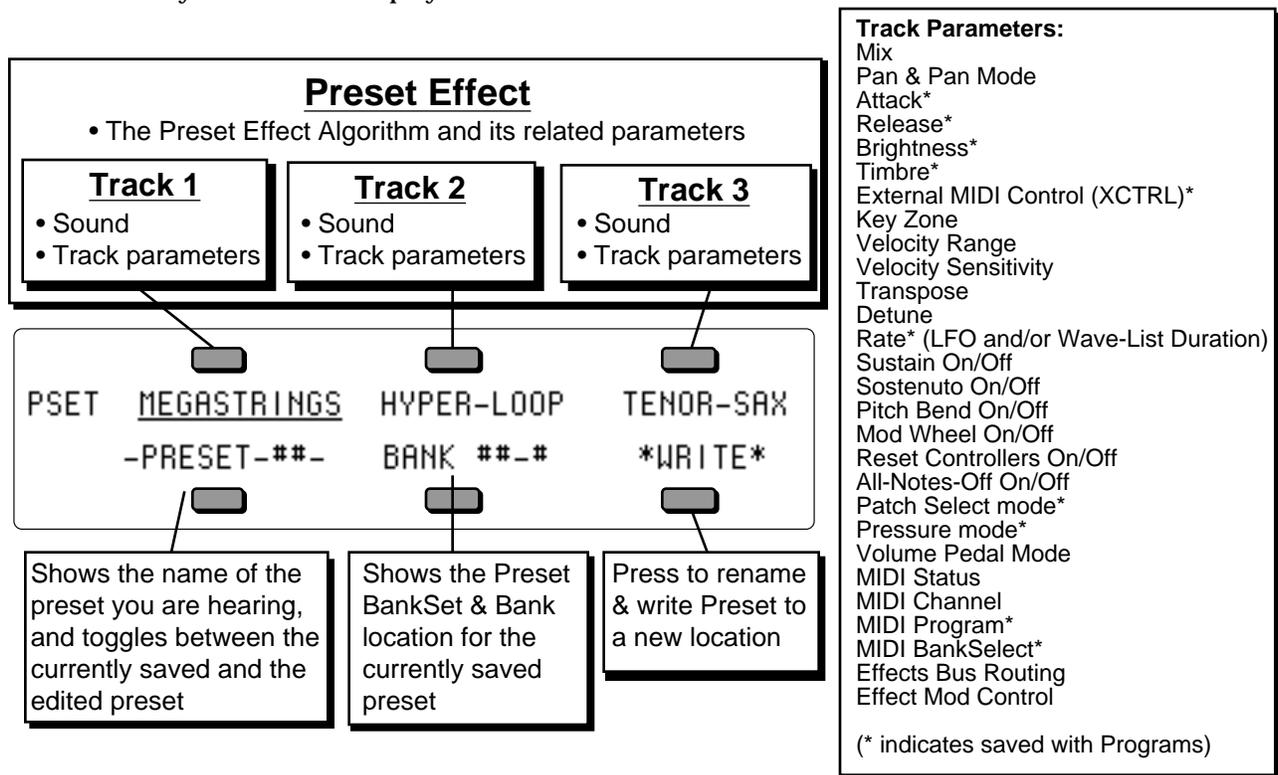
Press **Presets**. The LED above the **Presets** button lights, indicating that you are in Preset mode. The display shows you the currently selected bank of six presets, and the bottom left-hand corner of the display will show PSET. You can press the **BankSet** button and the ten **Bank** buttons (labeled 0-9) to select the various banks within Preset mode. Take a moment to select different presets by pressing the soft button closest to the preset (either above or below the preset name).

Since Preset and Program banks look very similar (both Presets and Programs have six 11-character names per page), the bottom left-hand corner of the display will show PSET when you are in Presets mode. This helps to differentiate between the two modes, as shown below:



Tip: Because you can use the **BankSet** button and the ten **Bank** buttons to “shop around” in various banks before selecting a preset, it is possible to lose track of where the currently selected preset (the one you are hearing) is located. Try this shortcut for getting to the **BankSet** and **Bank** that contains the selected preset: rapidly double-click the **Preset** button. This will instantly return you to the location that contains the currently selected preset.

Press the **Presets** button again. Across the top line, the display shows the names of the three sounds that are on the three tracks. On the lower line you see “context” information about the current preset. The illustration below shows the relationship of the preset and its three tracks to what you see on the display:



Whenever the **Presets** LED is lit, it means that the TS-12 is in Preset mode, and the ten **Bank** buttons beneath the display will select Preset Banks when you press them (rather than selecting Sound Banks, as they do when the **Sounds** LED is lit).

How Many Presets are in the TS-12?

The TS-12 offers 300 internal Presets:

- 120 presets in User RAM — 60 in BankSet U0 and 60 in BankSet U1.
- 180 presets in ROM — 60 in BankSet R2, 60 in BankSet R3, and 60 in BankSet R4.

Editing a Preset

In addition to the presets stored in memory, there is one more preset that you are using most of the time whether you know it or not. Whenever you are selecting or layering sounds in Sounds mode, you are also creating a preset. The TS-12 automatically “remembers” the last three sounds you selected and stores them in a special memory buffer called the *Preset Edit Buffer*. Try this:

- Press **Sounds** and select a sound by pressing its soft button.
- Layer another sound with the first by double-clicking its soft button.
- Layer a third sound by double-clicking on it.

You have created a preset with three sounds playing simultaneously. Suppose you wanted to adjust their relative volumes, or shorten the release time, or change the pan location of one of the sounds without losing the combination. You can do all of these things and a lot more with presets.

In Preset mode, whenever you are hearing the Preset Edit Buffer, the preset name is shown as *-EDITED-*. You can always toggle between the edited and currently selected preset by pressing the soft button closest to the preset name.

As we have already discussed, a preset consists of three tracks, each of which has a sound and a set of track parameters. The track parameters are found in the Track Parameters section of the front panel. Presets can be saved, so that you can call them up at any time, or you can use the Preset Edit Buffer in real-time as a powerful performance tool.

While you still have three programs layered, press the **Mix/Pan** button in the Track Parameter section. The display shows:

```
MIX  MEGASTRINGS  HYPER-LOOP  TENOR-SAX
      127           127           127
```

- Across the top line you see the name of the last three sounds you selected, one with a solid underline and the other two with flashing underlines, just as they appeared on the sound bank pages. A flashing line means that it is a layered sound.
- On the lower line you see the mix levels for each sound. You can select which one you want to adjust by pressing the soft button beneath the value, then adjust the value with the data entry controls.
- Note that you can select a track for editing (using the lower three soft buttons) independent of what is selected or layered on the upper line of the display. This means that you can adjust the volume of any of the three sounds in the layer without having to un-layer them.

On this and all Track Parameter pages, selecting or layering sounds from the upper line determines what sound(s) you *hear*, and selecting parameters on the lower line determines which track will be modified if you move the **Data Entry Slider** or the **Up/Down Arrow** buttons. Try pressing some of the other Track Parameter buttons — **Tuning**, **Brightness**, **Key Zone**, etc. — and adjusting the track parameters on those pages. You will soon see that within a preset, it's easy to create splits and layers, transpose a sound, change the pan and many other useful things. You can even assign one or more tracks in a preset to play *only* over MIDI, making presets a great tool for controlling remote MIDI instruments in combination with TS-12 sounds.

What are Preset/Track Parameters?

Preset/Track Parameters provide easy access and control for track and sound attributes, and are used in mixing/manipulating sequencer tracks and in creating presets.

A group of Preset/Track Parameters is associated with each preset and sequencer track. These parameters control various aspects of the track, including some important and useful sound controls which may be easily adjusted during performance, or recorded into the sequencer. The settings of these parameters are saved with every preset. These instantly recallable presets include an effect setup and three programs on three tracks with a full set of programmable performance parameters, including key zones, transpositions, release times, timbral variations and others. The settings of all performance parameters on sequencer tracks are saved for each track while the power to the TS-12 is off, and are always available.

The buttons which control the pages containing these parameters are found in the Track Parameters section of the front panel to the right of the display.

To view or adjust the setting of a particular type of track parameter, press the appropriate button in the Track Parameter section. The selected parameter type is indicated in the top-left corner of the display.

On the Track Parameter pages, the top line of the display will show the names of three programs and their current layering status. The name of the parameter type is abbreviated to four characters in order to make room for the program names, and is shown in the top left corner of the display. The bottom line of the display shows the current values of the selected parameter for the three tracks of the preset.

In Sequencer mode the current values of parameters for the six tracks (Tracks 1-6 or 7-12) will be displayed. You can press the **Tracks 1-6** or **7-12** button again to toggle back and forth between the TRAX page which shows the names of the programs on the tracks and the last selected track parameter page which shows parameter values.

The currently selected track parameter will be underlined. This is the active parameter which will be modified. You may select a parameter for a different track by using the soft buttons. When programming performance presets, the lower row of soft buttons is used to select tracks. For sequencer or song tracks, both upper and lower soft buttons are used.

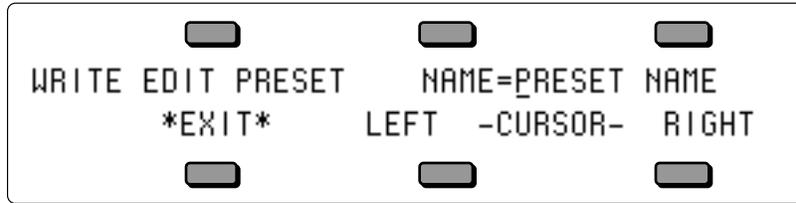
Remember that you can edit parameters on tracks that you are not hearing. The tracks that you can hear are indicated with solid or flashing underlines on their names.

Saving a Preset

Once you have created a preset you like, you can save it to one of the 120 Preset locations in the User RAM memory (you cannot save presets or sounds to the ROM memory — it is *read only*). Saving a preset to a User RAM location will *erase* the one that is currently there, so be careful.

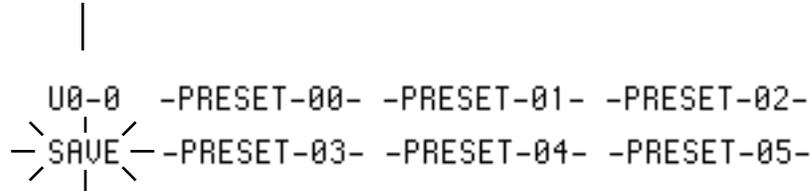
To save a preset, first decide which User RAM BankSet and Bank location you want to save it to, then:

- Press the **Presets** button twice to view your edited preset. If the display does not show your edited preset, press the soft button in the lower left corner of the display. The display should show “*-EDITED-*” in the lower left corner.
- Press the lower right soft button underneath the word “*WRITE*.”

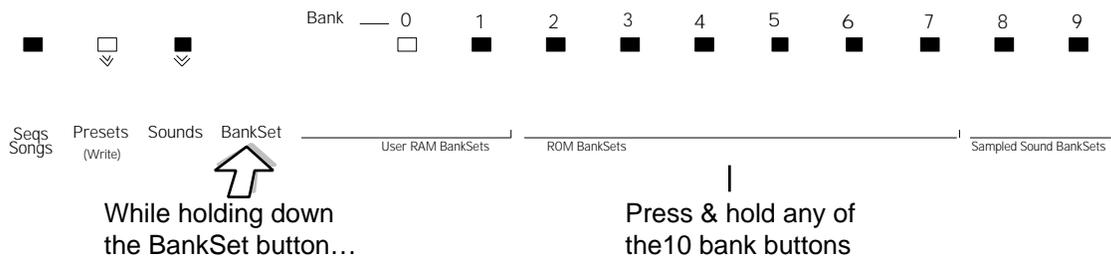


- The display shows the current name of the preset with a cursor (underline) beneath the first character. If you want to give the preset a new name, do so at this time. Use the **Up/Down Arrow** buttons and the **Data Entry Slider** to change the underlined character, and press the Left/Right Cursor (soft buttons) to move the underline.
- After you've named your preset, press and hold down the **Presets** button. The word **SAVE** flashes in the lower left corner of the display. The display shows the names of the presets in the currently selected BankSet and Bank. If you let go of the **Presets** button, the display will return to show the Preset Write page.

Currently selected BankSet & Bank location



- Press and hold any of the **Bank** buttons (0-9) to view the different preset banks. This allows you to select a Bank location within the current BankSet for your edited preset. While holding down a **Bank** button, press the **BankSet** button to toggle between the two User RAM BankSets.



- Once you've selected a BankSet and a Bank location for your edited preset, while holding down either the **Presets** button or the appropriate **Bank** button, press the soft button for the preset location into which you want to save your preset. Your edited Preset will be saved into that location, erasing the existing preset.

If you need to listen to a few presets in order to decide which one to replace, simply press the soft button beneath ***EXIT*** and then select presets just as you normally would. The word ***EDITED*** disappears from the screen, indicating that you are listening to saved presets. Your new preset is safe in the *Preset Edit Buffer*. But make sure you don't edit anything in any of the presets you audition, including selecting or layering sounds in Sound mode, or this will create a new Edit Preset, erasing the one you created.

When you are ready to save the new preset, press the **Presets** button, and then the lower left soft button. You will be returned to the Edit Preset (the word ***EDITED*** should return on the display). Now you can save the preset as described above.

Avoiding Confusion when using Presets

Whenever you create and save a preset, the TS-12 only “remembers” the *location* of the three sounds in memory — not the actual sounds themselves. This is important to remember when you use User RAM programs in presets. If you move a sound, put another in its place, or transfer an entire BankSet of sounds, the preset might still be “pointing to” a location that no longer contains the sound you had in mind.

For example, if you create and save a preset containing a brass sound, a string sound and a piano sound, and you then write over the piano sound with a flute sound, the flute sound will now appear in the location originally occupied by the piano in your preset.

Using the Replace Track Sound Function in Presets Mode

The Replace Track Sound function is primarily used for:

- Assigning sounds to tracks without changing the effects or other Track Parameters
- Determining the exact placement of sounds in a preset

Normally, when sounds are selected from the sound bank pages, they are transferred to a track in the Preset Edit Buffer, and many of the track parameters for that track are reset to standard default settings. However, you may wish to change which sound is assigned to a track in a preset without changing any of the other settings for that track. This is done using the Replace Track Sound feature in Presets Mode. The **Replace Track Sound** button is located next to the **Seq/Song Tracks 1-6** and **7-12** buttons on the bottom row in the Track Parameters section.

Replacing a Sound in a Preset

- Press one of the Track Parameter buttons, such as **Mix/Pan**, to display the current preset, and make sure that the correct track is selected. The track whose sound will be replaced is indicated by the underlined parameter value on the lower line of the display. It does not matter which Track Parameter page is displayed. Use the bottom three soft buttons below the display to select the correct track.
- Press the **Replace Track Sound** button. The last selected sound bank page will be displayed and the LED above the **Sounds** button will start to flash, indicating that you are in Replace Track Sound mode.
- Locate the sound that you wish to install into the track and press the soft button nearest to it. This sound is now installed on the track, and will acquire the status of the sound that was replaced if it was selected or layered. You may change BankSets, Banks, and/or continue to select replacement sounds until you are satisfied that you have found the right one. If you replace the sound on a track that is not currently selected or layered in the preset, you will be immediately returned to the preset page that you were on.
- Press **Replace Track Sound** again to exit Replace Track Sound mode and return to the preset page to verify that your change was correct. Pressing **Sounds** or any other page button will also exit Replace Track Sound mode.

The method described above is also used to change the sound assigned to a track in the current sequence or song. Unlike using Replace Track Sound in a Preset, using it in Sequencer Mode will update the track Program and Bank Select number to the correct value for the sound selected. See *Section 10 — Understanding the Sequencer* for more information.

Using SoundFinder in Presets Mode

Here's how to scroll through Programs that have the same defined Program Type in Presets mode. For this example, load the 120-PROGRAMS file called USERBNKS V2 from the TSD-200 disk:

- Press the **Presets** button.
- While pressing the **BankSet** button, press the **Bank 3** button. This selects ROM BankSet R3.
- Press the **Bank 0** button. This selects the first Bank in ROM BankSet R3. The display shows:

```

R3-0 AC-BS/PIANO AC-BS/ORGAN AC-BS/ELPNO
PSET AC-BS/NYLON AC-BS/VIBES AC-BS/VOICE

```

- Press the upper left soft button to select AC-BS/PIANO (an upright bass and piano split).
- Press the **Mix•Pan** button (pressing any Track Parameter button will allow you to view the three tracks that make up a Preset). The display shows:

```

MIX UPRITE-BASS FULL-BODY SCORING-STR
      100      090      100

```

In this Preset, FULL-BODY is the primary sound (solid underline) and UPRITE-BASS is layered (flashing underline) with it. In this scenario, we will use SoundFinder to audition other Programs that have the same Program Type as the FULL-BODY Program.

- Press the lower center soft button so that the cursor (underline) is beneath the FULL-BODY MIX value (090). The display should look like this:

```

MIX UPRITE-BASS FULL-BODY SCORING-STR
      100      090      100

```

- Press the **Replace Track Sound** button. Its LED should be lit.
- Press the **Up Arrow** button. The display now shows:

```

R2-0 BABY-GRAND FULL-BODY BRITE-PNO
      STEREO-PNO WARM-GRAND ALL-PURPOSE

```

- BRITE-PNO is underlined because it is the next Program that has the same Program Type as FULL-BODY.
- Press the **Up Arrow** button again. Notice that SoundFinder has moved from BRITE-PNO to

the STEREO-PNO Program. STEREO-PNO is also defined with the same Program Type as FULL-BODY.

- Continued presses of the **Up Arrow** will scroll forward through all of the Programs with the same Program Type. Continued presses of the **Down Arrow** button will scroll backward through all of the Programs with the same Program Type.
- When you've found the sound that you want, press the **Replace Track Sound** button to exit SoundFinder. The **Replace Track Sound** LED will no longer be lit, and you will be returned to the MIX page with the last sound selected replacing FULL-BODY.

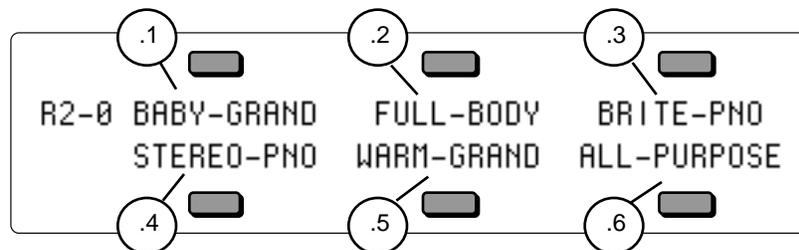
Replacing a Sound and the Effect in a Preset

You can replace the sound on a track *and* make its effect become the preset's effect by double-clicking the **Replace Track Sound** button:

- Select a preset and select the track whose sound you want to replace.
- Double-click **Replace Track Sound**. The last selected sound bank page will be displayed and the LEDs above the **Replace Track Sound** and the **Sounds** button will both start to flash, indicating that you are in Replace Track Sound mode.
- Use the **BankSet**, **Bank** buttons, and soft buttons to pick a sound as before; but now each time you pick a new sound, its effect will become the preset effect.
- Press **Replace Track Sound** again to exit Replace Track Sound mode and return to the preset page to verify that your change was correct.

Display Location

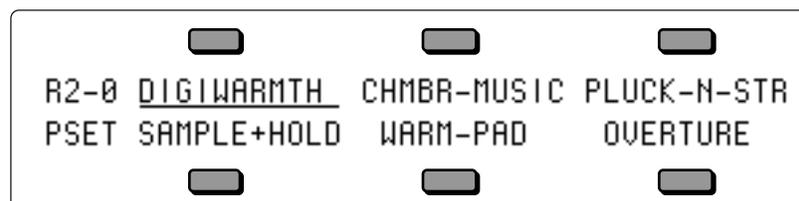
The following short cut for finding the locations of the sounds assigned to each Preset Track also shows the Display Location for each Program. For any Program or Preset Bank, the Display Locations are numbered as follows:



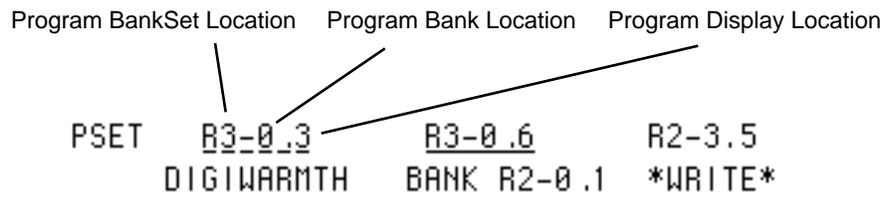
Finding the BankSet, Bank, and Display Location for Sounds on Preset Tracks

To find the BankSet, Bank and Display location (U0-1.5, U1-3.1, R2-7.4, etc.) for the sounds assigned to Preset tracks:

- Select a Preset to view (it should be underlined). For this example, we'll use the DIGIWARMTH preset located in R2-0.
- Press **Presets**.
- While holding down the **BankSet** button, press the **Bank 2** button.
- Press the **Bank 0** button.
- Press the upper left soft button in the display. The display now shows the Preset Bank page:



- Press and hold **Presets**, and then press **Sounds**. The display will show:



The BankSet, Bank, and Display location for each of the track sounds are shown on the top line of the display.

- Release both buttons and the track names will be redisplayed:

PSET GLASS-KEYS_ BEST-PAD OL-FAITHFUL
 DIGIWARMTH BANK R2-0.1 *WRITE*

Preset BankSet Location

Using Effects With Performance Presets

All three tracks in each preset, and all twelve tracks in each sequence or song, share the same effects algorithm and settings. The effects settings for each preset is inherited from the primary (non-layered) selected sound, and any layered sounds in the preset will use that same effect. The effects settings for each sequence or song are inherited from the current sequencer effect at the time the sequence or song was created. If this effect is incompatible with other programs in the preset, sequence or song, there are several options:

- set the effects bus routing to **-DRY-** for any of the programs that are incompatible
- set the effects bus routing to **-AUX-** for programs that you want to process separately by sending them to the AUX Outputs
- change the preset/sequence/song effect to be something more suitable

When you press the **Track Effects** button from preset or sequencer mode, the first page that appears is the Track Effects Bus Routing page. On this page you can override the normal effects routing of the sound on each track. Subsequent sub-pages let you edit the effect for use in a preset, sequence, or song; these pages are identical to the effects programming pages under the **Program Effects** button. See *Section 6 — Understanding Effects* for more information on effect selection and programming.

Section 5 — Preset/Track Parameters

This section offers detailed descriptions of the commands and parameters used in selecting, creating, and editing Performance Presets as well as sequencer tracks. For an overview of the concepts involved, refer to *Section 4 — Understanding Presets*.

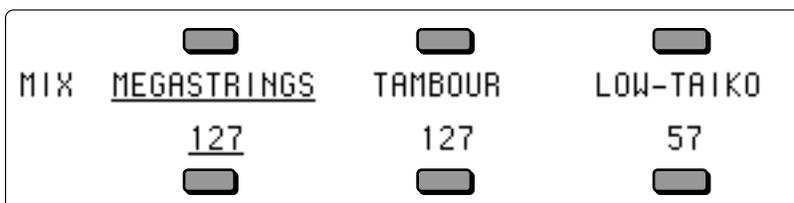
The default settings for several of the Track Parameters are stored with Programs. These default settings are installed whenever a Program is put on the Track. Editing these values at the track level will not edit the default settings stored with the program. If you want to edit the values that are stored with a Program, they are available on the first sub-page of the Program Control page.

Unless otherwise noted in the detailed descriptions which follow, use the **Up/Down Arrow** buttons or the **Data Entry Slider** to adjust the value of the parameter.

- Press the **Mix/Pan** button to get to the Mix page:

Mix Page

Range: 000 to 127



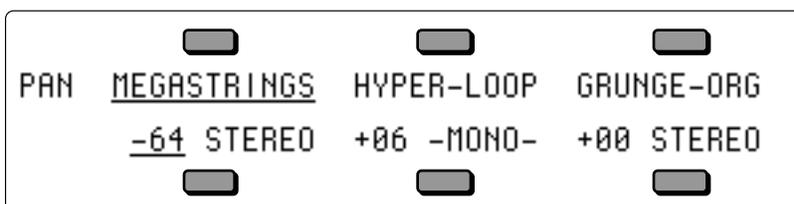
The Mix Page enables you to make volume changes to the individual tracks, allowing you to balance the TS-12 sounds and/or control the volume of external MIDI devices. In sequencer mode, the MIX page has a special function which allows you to click or double-click on specific tracks to mute or solo them during playback of sequences or songs.

All tracks whose MIDI Status is set to SEND/RECV, SEND/---, VOICE-OFF, or LOCAL-OFF will send a MIDI Volume Change message (controller 7) with the indicated value whenever this parameter is edited. Sequencer and preset tracks will also send the current volume for each track when a sequence or preset is selected.

- Press the **Mix/Pan** button again to get to the Pan page:

Pan Page

Range: -64 to +63, STEREO or -MONO-



The Pan Page gives you control over the placement of the track's sound in a stereo field. A PAN setting of -64 is hard left, and +63 is hard right.

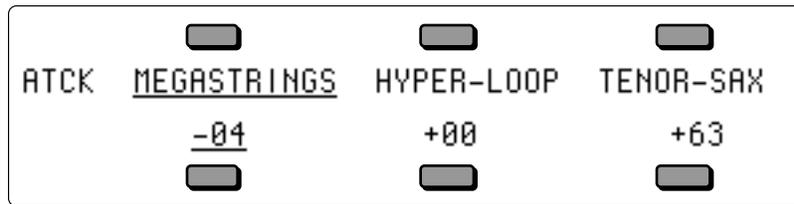
Press the soft button underneath the PAN value again to select either STEREO or -MONO-. When -MONO- is selected, it will override the settings originally programmed on the Output page and force ALL of the voices of the sound to the new pan location. -MONO- is the optimal setting when using parallel effects, because it allows for discrete routing into the two components of the FX-1 effect. When this is set to STEREO, and the PAN is set to +00, the voices of a sound are panned according to the settings originally programmed on the Output page.

All tracks whose MIDI Status is set to SEND/RECV, SEND/---, LOCAL-OFF or VOICE-OFF will send a MIDI Continuous Controller message (controller 10) with the indicated value whenever this parameter is edited. Preset tracks will also send this controller message when a preset is selected.

- Press the **Attack/Release** button to get to the Attack page:

Attack Page

Range: -64 to +63



The Attack Page allows you to increase or decrease the attack time of the sound on a selected track. Attack time is the time it takes for the sound to be heard when the key is pressed. This is useful when you need to adjust the attack characteristics of a sound for a particular application without getting more deeply into programming. Higher values offer a longer attack time, and could be used to create a fade in effect.

In order for a Program to be controlled by this parameter, one or more of the envelopes in the Program must be programmed with the Envelope ATTACK parameter set to a value with a star (*) suffix. For example, if a voice's ENV3 TIMES - ATTACK=50* instead of simply 50, then the attack time of Envelope 3 can be adjusted from the Track Attack parameter. It is typical to have at least Envelope 3 controlled by the parameter on this page.

The current value of Attack is saved with the sound whenever a sound is written, and is restored whenever the sound is selected or placed on a track.

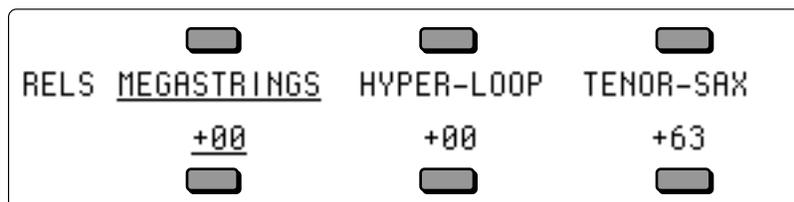
All tracks whose MIDI Status is set to SEND/RECV, SEND/---, LOCAL-OFF or VOICE-OFF will send a MIDI Continuous Controller message (controller 73) with the indicated value whenever this parameter is edited. Preset tracks will also send this controller message when a preset is selected.

The default value of Attack is stored with the Program, and is restored whenever the Program is selected or placed on a track. The default value can be edited on the Program Control page. This parameter does not affect Sampled Sounds.

- Press the **Attack/Release** button again to get to the Release page:

Release Page

Range: -64 to +63



The Release Page enables you to increase or decrease the release time of the sound on a selected track. Release time is the time it takes for the sound to fade away when the key is released. This is useful when you need to adjust the release characteristics of a sound for a particular application without getting more deeply into programming. Higher values lengthen release time, lower values shorten release time.

In order for a Program to be controlled by this parameter, one or more of the envelopes in the Program must be programmed with the Envelope RELEASE parameter set to a value with a star (*) suffix. For example, if a voice's ENV3 TIMES - RELEASE=50* instead of simply 50, then the release time of that Envelope 3 can be adjusted from the Track Release parameter. It is typical to have at least Envelope 3 controlled by the parameter on this page.

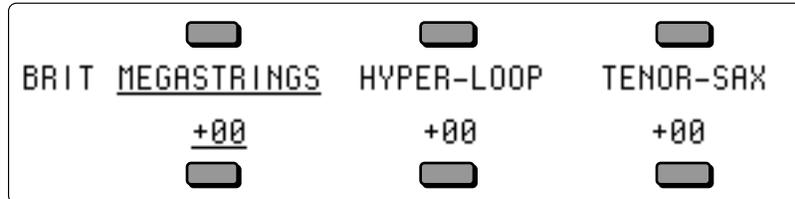
All tracks whose MIDI Status is set to SEND/RECV, SEND/---, LOCAL-OFF or VOICE-OFF will send a MIDI Continuous Controller message (controller 72) with the indicated value whenever this parameter is edited. Preset tracks will also send this controller message when a preset is selected.

The default value of Release is stored with the Program, and is restored whenever the Program is selected or placed on a track. The default value can be edited on the Program Control page.

- Press the **Brightness/Timbre** button to get to the Brightness page:

Brightness Page

Range: -64 to +63



The Brightness page enables you to increase or decrease the filter cutoff frequency for each voice within the sound on a selected track. This is useful when you need to adjust the brightness of a sound for a particular application without getting more deeply into programming. Generally, higher BRIT values increase brightness, lower values decrease brightness (when Filter2=HI-PASS on the Filters Page, the functionality of the Brightness parameter is reversed).

In order a Program to be controlled by this parameter, at least one of the two Filter CUTOFF parameters for at least one voice in the Program must be programmed with the CUTOFF parameter set to a value with a star (*) suffix. For example, if a voice's FILTER1 CUTOFF=125* instead of simply 125, then the brightness of that voice can be adjusted from the Track Brightness parameter.

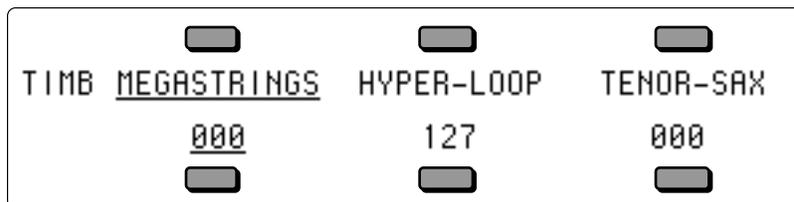
All tracks whose MIDI Status is set to SEND/RECV, SEND/---, LOCAL-OFF, or VOICE-OFF will send a MIDI Continuous Controller message (controller 74) with the indicated value whenever this parameter is edited. Preset tracks will also send this controller message when a preset is selected.

The default value of Brightness is stored with the Program, and is restored whenever the Program is selected or placed on a track. The default value can be edited on the Program Control page.

- Press the **Brightness/Timbre** button again to get to the Timbre page:

Timbre Page

Range: 000 to 127



The Timbre page provides an easy way to make useful changes to the character of a sound without getting into more complex programming. This performance parameter uses the **Data Entry Slider** or **Up/Down Arrow** buttons to control various aspects of the sound, depending on what the programmer has decided would be useful.

As one of the voice modulation sources, Timbre can be assigned to any parameter that can be modulated in a sound or effect. The Timbre control can be connected to parameters such as filter cutoff, waveform modulation, LFO rate, and others. It is a good idea to experiment with the Timbre setting to hear what it has been programmed to do in each sound.

The Timbre parameter also controls the *relative* volume modulation amounts for each of the six program voices (assigned on the TIMBRE sub-page found on the Program Control Page). This allows you to determine how much louder or softer each voice will become as the Timbre modulation controller is increased or decreased.

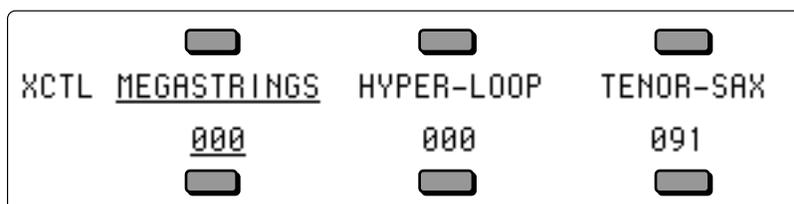
All tracks whose MIDI Status is set to SEND/RECV, SEND/---, LOCAL-OFF or VOICE-OFF will send a MIDI Continuous Controller message (controller 71) with the indicated value whenever this parameter is edited. Preset tracks will also send this controller message when a preset is selected. This parameter does not affect Sampled Sounds.

The default value of Timbre is stored with the Program, and is restored whenever the Program is selected or placed on a track. The default value can be edited on the Program Control page.

- Press the **Brightness/Timbre** button a third time to get to the External Control page:

External Control Page

Range: 000 to 127



The External Control parameter transmits on a user-definable MIDI Controller number (set on the MIDI Control Page), and transmits the full range of 000 to 127. It will also modulate any voice or effect parameters that have XCTRL selected as a Mod Source. Any remote MIDI device that can transmit the same MIDI Controller number can act as a modulator by sending controller messages to the TS-12.

All tracks whose MIDI Status is set to SEND/RECV, SEND/---, LOCAL-OFF or VOICE-OFF will send a MIDI Continuous Controller message (on the controller number assigned to the XCTRL parameter on the MIDI Control page) with the indicated value whenever this parameter is edited. Preset tracks will also send this controller message when a preset is selected.

The default value of XCTRL is stored with the Program, and is restored whenever the Program is selected or placed on a track. The default value can be edited on the Program Control page.

- Press the **Key Zone/Velocity** button to get to the Key Zone page:

Key Zone Page

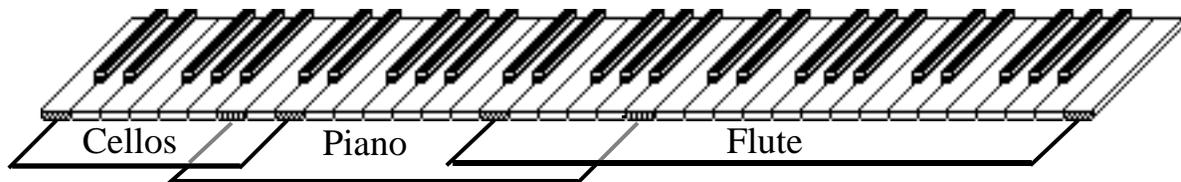
Range: A0 to C8



Each track has its own independent key zone within which the track will play. Key zones can be used to create simple two-program splits or to create more complex keyboard layouts. Key zones control which keys will be sent out via MIDI as well as which keys will play on the local voices of the TS-12.

You can divide the keyboard into as many as twelve different key zones by using the twelve sequencer tracks. In addition, you can set the key zone so that each zone overlaps the next, producing “layered” zones in which you would hear the sounds from more than one track.

The illustration below shows an example of three tracks with overlapping key zones. The Piano is layered with, and partially overlaps, the Cellos on the lower end and the Flute on the upper end. The Key Zone settings for this example are shown in the sample display above.



In order to set a Key Zone:

- 1) Select the track by pressing the soft button underneath the zone you wish to set. This will result in the Low Key of the zone (the left key number) becoming underlined.
- 2) Play the key on the keyboard that you want to be the *lowest* key of the zone. The underline will automatically move to the right for the High Key of the zone.
- 3) Play the key for the *highest* key of the zone. The new values for the zone will be displayed and the underline will disappear. With the underline gone, you can play the keyboard without continually resetting the key zone range. This allows you to “audition” the newly created key range.

If you wish to change the zone, simply repeat the process.

The key zone is automatically reset to full range whenever you select a sound from one of the Sound Bank pages. When you select a sound using the Replace Track Sound feature, the key zone setting is left unchanged.

Changing the key zone will *not* affect the playback of sequencer tracks (though it does affect what is recorded). Sequencer tracks will play all keys that were recorded, regardless of the key zone at the time of playback. To eliminate a key range from a track, use the Erase function on the Edit Track page (explained in *Section 11 — Sequencer Parameters*).

Be Careful!

If the key zone is accidentally set to a range where the High Key is below the Low Key, then the track will not play. To correct this situation, you can re-program the zone manually or you can reselect the sound from the Sound bank page, which will automatically reset the key zone to the sound's original range.

- Press the **Key Zone/Velocity** button again to get to the Velocity Range page:

Velocity Range Page

Ranges: 000 to 127

VELR	<u>MEGASTRINGS</u>	HYPER-LOOP	<u>TENOR-SAX</u>
	<u>000-063</u>	000-127	064-127

The Velocity Range page enables you to determine the amount of velocity for each sound on a selected track. The velocity range affects both local playing and MIDI transmission/reception. The first value sets the LO velocity range, and the second value sets the HI velocity range. The soft button beneath the velocity ranges is used to toggle between the LO and HI settings. This is useful when you need to adjust the velocity of a sound for a particular application without getting more deeply into programming.

In the example above, a soft velocity will only play the MEGASTRINGS sound, and a harder velocity will only play the TENOR-SAX sound. HYPER-LOOP is not layered (underlined), so it will not be heard. If you could double-click on the soft button above HYPER-LOOP, you would hear HYPER-LOOP with both soft and hard velocity.

Note: This parameter will not regulate what notes are recorded into the Sequencer, but will affect Sequencer playback. VELR acts as a filter on Sequencer playback.

- Press the **Key Zone/Velocity** button again to get to the Velocity Sensitivity page:

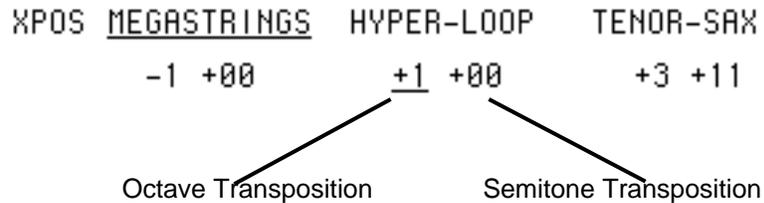
Velocity Sensitivity Page

Ranges: -16 to +16

- Press the **Tuning** button to get to the Transpose page:

Transpose Page

Octave Range: -4 to +4 octaves
Semitone Range: -11 to +11 semitones



Each track can have its pitch transposed (raised or lowered) by octaves and semitones within an eight octave range. The transpose setting affects both the pitch played by local TS-12 voices and the key number transmitted via MIDI, depending on how the VEL5/XPOS parameter is set on the MIDI Control page.

Pressing the soft button for an already selected track will toggle the underline (showing the active field) between octave and semitone.

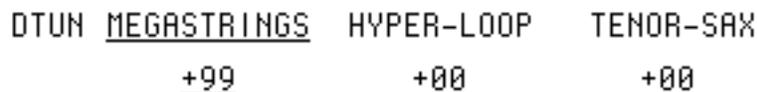
Tip: It is possible to extend the transposition outside of the normal range by using the **Up/Down Arrow** buttons to edit the semitone value to a maximum of + or - 9 octaves and 11 semitones, although this may cause unexpected results.

In Sequencer mode, the Transpose function provides a way to transpose tracks in real-time without changing the data in the track. However, you should take care never to transpose a track whose status is SEND/RECV, SEND/----, VOICE-OFF, or LOCAL-OFF while holding keys down or while the sequencer is running. This could cause the key-up events to be missed by the receiving MIDI device, causing notes to “hang.”

- Press the **Tuning** button again to get to the Detune page:

Detune Page

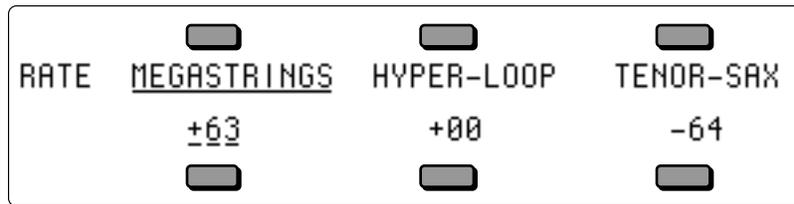
Range: -99 to +99



- Press the **Tuning** button a third time to get to the Rate page:

Rate Page

Range: -64 to +63



The Rate page provides an easy way to change the rate of the LFO's within a sound. LFO's are most often used to create a vibrato effect. This parameter defines how much the LFO rate will increase or decrease for any voice within a sound that has LFO selected as a Mod Source.

In order for LFO's in a Program to be controlled by this parameter, one or more of the LFO's in the Program must be programmed with the LFO RATE parameter set to a value with a star (*) suffix. For example, if a voice's LFO RATE=50* instead of simply 50, then the rate of that LFO can be adjusted from the Track Rate parameter.

When one or more voices in a Program are assigned to play a Wave List in a HyperWave Program, the Track Rate parameter will modulate the DURATION and XFADE times relative to one another. This allows you to fine tune the rate of Wave List playback to conform to a particular musical context. It is often useful to disable the Track LFO Rate control (i.e.: turn off the star) in voices that are assigned to play a Wave List; this will avoid unwanted LFO Rate modulation when adjusting Wave List times.

All tracks whose MIDI Status is set to SEND/RECV, SEND/---, LOCAL-OFF or VOICE-OFF will send a MIDI Continuous Controller message (controller 75) with the indicated value whenever this parameter is edited. Preset tracks will also send this controller message when a preset is selected.

The default value of Rate is stored with the Program, and is restored whenever the Program is selected or placed on a track. The default value can be edited on the Program Control page.

- Press the **Controllers On/Off** button to get to the Sustain page:

Sustain Page

Range: OFF or ON

SUST	<u>MEGASTRINGS</u>	HYPER-LOOP	TENOR-SAX
	ON	ON	OFF

The Sustain page allows you to determine whether each of the individual tracks will respond to sustain controller events. The effect of all sustain events, whether from the SW-2 Foot Switch (when the corresponding foot switch is set to SUSTAIN on the System page) or sustain commands received from MIDI, is controlled by this switch.

- ON — sustain events will affect all notes played within the active key zone for this track.
- OFF — sustain events will have no effect on the notes played on this track.

For example, it may be useful to turn off sustain events on a track set up as a bass sound in a split keyboard configuration. This allows you to play staccato bass lines on the lower part of the keyboard while playing chords on the upper part of the keyboard and using the sustain pedal. The bass notes will not be affected by the sustain pedal because the track is set to OFF, but the chords will sustain.

Sustain Pedal Off events are always transmitted via MIDI (except if track status is set to ---/RECV or MIDI-OFF) whenever the Sustain Pedal Enable switch setting on the track is changed. This is done to ensure that external MIDI devices are not left with the sustain pedal controller “stuck” in the held down state.

- Press the **Controllers On/Off** button again to get to the Sostenuto page:

Sostenuto Page

Range: OFF or ON

```

SOST MEGASTRINGS  HYPER-LOOP  TENOR-SAX
      OFF           ON           OFF
  
```

The Sostenuto Page, similar to the Sustain page, allows you to determine whether each of the individual tracks will respond to sostenuto controller events. The effect of all sostenuto events, whether from the SW-2 Foot Switch (when the corresponding foot switch is set to SOSTENUTO on the System page) or sostenuto commands received from MIDI, is controlled by this switch.

- ON — sostenuto events will affect all notes played within the active key zone for this track.
- OFF — sostenuto events will have no effect on the notes played on this track.

Sostenuto Pedal Off events are always transmitted via MIDI (except if track status is set to ---/RECV or MIDI-OFF) whenever the Sostenuto Pedal Enable switch setting on the track is changed. This is done to ensure that external MIDI devices are not left with the sostenuto pedal controller “stuck” in the held down state.

- Press the **Controllers On/Off** button a third time to get to the Pitch Bend page:

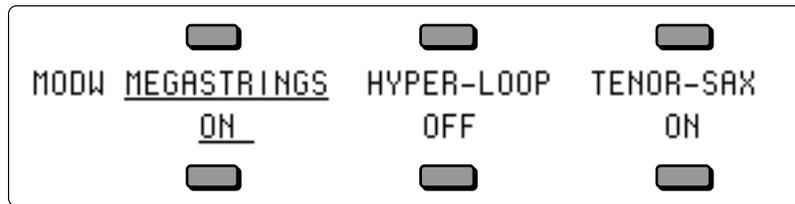
Pitch Bend Page

Range: OFF or ON

- Press the **Controllers On/Off** button a fourth time to get to the Mod Wheel page:

Mod Wheel Page

Range: OFF or ON

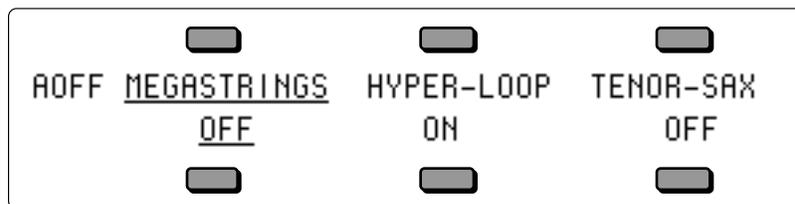


The Mod Wheel Page is used to determine which track(s) will respond to the Modulation Wheel, when assigned as a controller for any of the modulatable parameters.

- Press the **Controllers On/Off** button a fifth time to get to the All-Notes-Off page:

All-Notes-Off Page

Range: OFF or ON

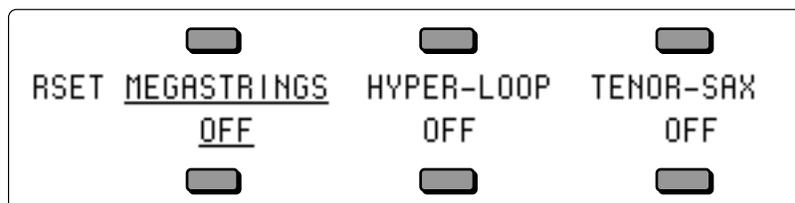


The All-Notes-Off Track parameter determines how the sequencer will handle note-off transmission. This parameter is visible on Preset Tracks, but does not really apply to Presets. When OFF, the TS-12 will transmit key-up messages for every note currently sounding when the Sequencer **Stop/Continue** button is pressed to stop the Sequencer. When ON, the TS-12 will send an ALL-NOTES-OFF message in addition to all of the key-ups when the Sequencer **Stop/Continue** button is pressed to stop the sequencer.

- Press the **Controllers On/Off** button a sixth time to get to the Reset Controllers page:

Reset Controllers

Range: OFF or ON



The RSET parameter determines whether or not the TS-12 will transmit the MIDI Reset Controllers message, in addition to transmitting a default value for every controller on each Track, in the following instances:

- 1) each time the Sequencer **Stop/Continue** button is pressed to stop the Sequencer
- 2) each time a Song Step ends
- 3) each time a Song loops back to the beginning.

This parameter is visible on Preset Tracks, but does not really apply to Presets.

- Press the **Performance Options** button to get to the Patch Select page:

Patch Select Page

Range: (described below)

	PSEL	<u>MEGA</u> STRINGS	HYPER-LOOP	TENOR-SAX
current Patch Select button state	00	<u>-0*-</u>	HELD	LIVE

This Page gives you control over the Patch Select button assignments for each track.

<u>Setting</u>	<u>Patch used by track</u>
LIVE	uses the current state of the buttons to select a patch
-00-	always uses the 00 patch (no buttons down)
-0*-	always uses the 0* patch (right button down)
-*0-	always uses the *0 patch (left button down)
-**-	always uses the ** patch (both buttons down)
HELD	uses the patch set by the first key hit while touching the patch select buttons

The HELD setting is special because it lets you easily hold a patch select variation by playing a key on the keyboard while touching the patch select button(s). The first key you play after touching the patch select buttons will hold that patch select variation as the current patch for the track. You may then continue to play without having to touch the patch select buttons, which makes two-handed playing easier. If you wish to return to the 00 patch, touch either of the patch select buttons and release it *before* you play the next note. This will hold the 00 patch.

When programming patch variations, you can set the mute status of the various voices in different patches without leaving the Select Voice page by using the HELD feature.

The default value of Patch Select Mode (LIVE or HELD) is stored with the Program, and is restored whenever the Program is selected or placed on a track. The default value can be edited on the Program Control page.

Latching Patch Selects

Latching is more permanent than holding because once latched, the patch will remain assigned to the track even if the patch select buttons are touched again later.

While the Patch Select page is being displayed in either Preset or Sequencer modes, it is possible to instantly “latch” the current state of the patch select buttons into a track by pressing the soft button for the currently selected track. If neither of the patch select buttons are being held down when this function is performed, the parameter setting will revert to LIVE status. If you wish to set the status to 00, then use the **Up/Down Arrow** buttons to change the fixed setting. To latch the patch select setting for a different track, first press the soft button to select the track, then press it again while holding one or both patch select buttons to latch the setting.

For more information on programming the Patch Selects, refer to *Section 8 — Understanding Programs*.

- Press the **Performance Options** button again to get to the Pressure page:

Pressure Page

Range: (described below)

```

PRES  MEGASTRINGS  GRAND-PIANO  TENOR-SAX
           OFF           CHAN           KEY

```

The Pressure page enables you to assign one of three pressure modes to each Track.

- **OFF** — Pressure information will not be transmitted via MIDI or recorded by the sequencer, nor will the sound assigned to the track respond to pressure locally.
- **KEY** — This setting enables the track to receive Poly-Key™ pressure via incoming MIDI. Poly-Key pressure lets you add pressure modulation to each note independently. If you press down on any particular key within a chord, only that note will be affected by pressure — all others remain unaffected. Although the TS-12's keyboard does not generate Poly-Key pressure, it does receive it via incoming MIDI.

When PRESS-MODE=CHAN on the System page, all Sounds and Preset Tracks that are set to KEY will have their Track Pressure mode automatically set to CHAN; Sounds and Preset Tracks that have their Pressure mode set to OFF will be unaffected. The PRESS-MODE=PSET setting disables this function, and installs the Sound and Preset Track Pressure settings as stored in the Sounds or Presets.

- **CHAN** — This enables the track to send and receive via MIDI the most common type of pressure — channel pressure. With channel pressure, after a note is played, pressing down harder on a key modulates *every* note currently playing. Like a mod wheel, channel pressure is “global,” it affects the entire keyboard when activated. When a sequencer track is set to CHAN, Channel pressure will be recorded into the track, even if the sound is not programmed to respond to it (see the note below about conserving sequencer memory).

You should consult the MIDI implementation chart of the remote MIDI device you will be using in conjunction with the TS-12 to see which (if any) type of pressure it responds to and transmits. For best results, set the TS-12 Pressure parameter to match the type of pressure supported by the external MIDI device which will send to or receive from the track you are setting.

The default value of Pressure Mode is stored with the Program, and is restored whenever the Program is selected or placed on a track. The default value can be edited on the Program Control page.

Note: You should select Track PRES=OFF whenever you don't want or need pressure for a given sound, particularly when sequencing. Pressure data eats up sequencer memory rapidly, so whenever you record a track with a sound that doesn't respond to pressure, set this parameter to OFF. This will avoid wasting valuable sequencer memory, and will avoid clogging up the MIDI data stream with a lot of unnecessary pressure information. Existing pressure information can also be removed from a track using the Filter command on the Edit Track page.

- Press the **Performance Options** button again to get to the Pedal page:

Pedal Page

Range: (described below)

```

PEDL MEGASTRINGS  HYPER-LOOP  TENOR-SAX
      OFF           VOL+         VOL-
  
```

The Pedal parameter disables (when OFF) or controls the polarity of the CV•Pedal, when PEDAL=VOL on the System page. Inverted polarity can be used to crossfade between layered tracks with the volume pedal.

- Press the **Track/MIDI** button to get to the MIDI Status page:

MIDI Status Page

Range: (described below)

```

STAT MEGASTRINGS  HYPER-LOOP  TENOR-SAX
      SEND/RECV   SEND/----  MIDI-OFF
  
```

This page determines the MIDI Status of a track (i.e. whether it will play locally, only over MIDI, or both). The six possible settings are:

SEND/RECV	Keys, controllers, etc., will play locally <i>and</i> will be sent via MIDI over a selected MIDI channel. Incoming MIDI will play internal voices. This is the default setting for Presets.
SEND/----	Similar to SEND/RECV, keys, controllers, etc., will play locally <i>and</i> will be sent via MIDI over a selected MIDI channel. However, incoming MIDI will <i>not</i> play internal voices.
----/RECV	The track will only play internal voices, and will not send any data out MIDI. Incoming MIDI will play internal voices. This is the default setting for sequencer tracks.
MIDI-OFF	The track will only play internal voices, and will not send any data out MIDI. Incoming MIDI will not play internal voices.
VOICE-OFF	Keys, controllers, etc., will be sent out via MIDI when the track is played from the keyboard. However, keys played on the local keyboard will not play TS-12 voices at all. Incoming MIDI and sequencer playback will <i>not</i> play internal voices. This is useful when using the TS-12 as a controller with an external sequencer and a number of other remote MIDI devices. It is also good for turning off certain tracks when using the TS-12 as a multi-timbral receiver in MULTI Mode, thereby limiting the number of channels to which the TS-12 will respond.
LOCAL-OFF	Keys, controllers, etc., will be sent out via MIDI when the track is played from the keyboard. However, keys played on the local keyboard will not play TS-12 voices at all. Incoming MIDI and sequencer playback <i>will</i> play TS-12 voices. Use this status when you want to create MIDI-only tracks for sequencing or playing remote MIDI devices.
MIDI-LOOP	This track STATUS is optimized for use in a MIDI loop. It functions just like LOCAL-OFF, except that the sequencer will not play local voices. This ensures that sounds will not play twice (once locally and again via incoming MIDI) when sequencing in a MIDI loop. See <i>Section 10 — Understanding the Sequencer</i> for information about recording into the sequencer in a MIDI loop.

Note: When MIDI-TRK-NAMES=OFF on the System page, Tracks with a MIDI Status of VOICE-OFF or LOCAL-OFF or MIDI-LOOP will display *MIDI-CH-## in place of the name of the sound on the track.

This chart details the behavior of sequencer tracks for each MIDI status:

Track Status	SEND/RECV	SEND/----	----/RECV	MIDI-OFF	VOICE-OFF	LOCAL-OFF	MIDI-LOOP
Playing the keyboard plays local voices	YES	YES	YES	YES	NO	NO	NO
Playing the keyboard sends out MIDI	YES	YES	NO	NO	YES	YES	YES
Playing the keyboard will be recorded by the sequencer	YES	YES	YES	YES	YES	YES	YES
Incoming MIDI data plays local voices	YES	NO	YES	NO	NO	YES	YES
Incoming MIDI data will be recorded by the sequencer	YES	NO	YES	NO	YES	YES	YES
Playing the sequencer track (pressing Play) plays local voices	YES	YES	YES	YES	NO	YES	NO
Playing the sequencer track sends out MIDI	YES	YES	NO	NO	YES	YES	YES

- Press the Track/MIDI button again to get to the MIDI Channel page:

MIDI Channel Page

Range: 01 to 16 (MIDI Channels)

```

CHAN  MEGASTRINGS  HYPER-LOOP  TENOR-SAX
      01             02             03

```

Use the MIDI Channel page to determine which MIDI channel a track will use to transmit and receive data. The differences in how this parameter controls the track for transmitting and receiving are important to understand and are described below. You may also wish to refer to Section 3 — MIDI Control Page Parameters, and Section 12 — Sequencing/MIDI Applications.

Transmit Controls which channel the three tracks of a preset will *send* data on only if SEND=TRACK is selected on the MIDI Control Page. Otherwise, in Preset mode, the TS-12 keyboard will send only on the base MIDI channel no matter which preset track is selected. Sequencer tracks which have SEND/RECV, SEND/----, VOICE-OFF, LOCAL-OFF, or MIDI-LOOP Status will *always* transmit only on the MIDI channel defined on this page.

Receive Controls which channel an individual sequencer track will *receive* data on if MODE=MULTI or MONO B mode is selected on the MIDI Control Page. In POLY or MONO A modes, the TS-12 will receive only on the base MIDI channel no matter which track, program, or preset is selected. Individual preset tracks will *not* receive on different MIDI channels; for presets, this is a send-only function.

Note: If several tracks have the same MIDI channel, only the *lowest-numbered* track (1 to 12) will receive the incoming MIDI events. See Section 12 — Sequencing/MIDI Applications for more information about MULTI mode.

- Press the **Track/MIDI** button a third time to get to the MIDI Program Number page:

MIDI Program Number Page

Range: 000 through 127

```

PROG  MEGASTRINGS  HYPER-LOOP  TENOR-SAX
           002           007           001

```

This sub-page lets you choose which MIDI Program Change number will be transmitted via MIDI when the track is selected. Editing this value will transmit MIDI Program Changes in real-time. If the track MIDI status has been set to ---/RECV or MIDI-OFF, the track will not transmit MIDI Program Changes.

The default Program Change number that appears is usually the number of the internal TS-12 sound assigned to the track. This number is automatically set whenever a sound is selected from the Sound Bank pages. Assigning a new sound to a Preset track from Replace Track Sound mode does *not* change the Program Change number automatically, but sequencer tracks *will* acquire the new sound's Program Change number. When sequencer playback loops back to the beginning of a track, all Track Program Change values will be restored to their stored values.

You can set this number to any other legal Program number if you wish to override the default value. This can be useful in presets and sequencer tracks, which will transmit a MIDI Program Change message for every MIDI-enabled track when selected.

Entering Program Change Numbers Directly

While this page is displayed (or from the Tracks 1-6 and 7-12 pages in sequencer mode), it is possible to send MIDI program change messages by holding the soft button nearest the track sound name and then entering the MIDI program change number using the numbered **Bank** buttons. When you release the soft button, the program change will be sent, and the program number will be updated in the display. The range of acceptable numbers is 000 to 127. You do not have to enter leading zeroes (for example, to send 003, simply press **3** and release the soft button).

- Press the **Track/MIDI** button again to get to the MIDI Bank Select page:

MIDI Bank Select Page

Range: 000 through 127, LSB or MSB

```

BANK  MEGASTRINGS  HYPER-LOOP  TENOR-SAX
           000 LSB           000 MSB           127 LSB

```

The second field determines whether the BANK value represents the LSB or MSB of the MIDI Bank Select controller message. It defaults to LSB (Least Significant Byte), but can be set to MSB (Most Significant Byte) to accommodate other keyboard manufacturer's products. It should always be set to LSB for ENSONIQ products.

The default Bank Select number that appears is usually the number of the internal TS-12 sound assigned to the track. This number is automatically set whenever a sound is selected from the Sound Bank pages. Assigning a new sound to a Preset track from Replace Track Sound mode does *not* change the Bank Select number automatically, but sequencer tracks *will* acquire the new sound's Bank Select number. When sequencer playback loops back to the beginning of a track, all Track Bank Select values will be restored to their stored values.

You can set this number to any other legal Bank Select number if you wish to override the default value. This can be useful in presets and sequencer tracks, which will transmit a MIDI Bank Select message for every MIDI-enabled track when selected.

Program Changes and Bank Selects in the TS-12

When sounds are assigned to a track from a Sound Bank page, their Program Change number and Bank Select number are automatically set according to the following scheme:

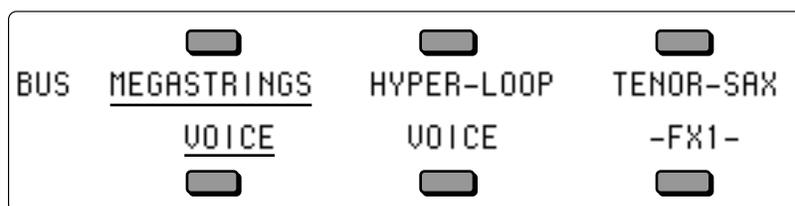
- User RAM programs (BankSet U0) are numbered from 000 to 059; Bank Select is 000 LSB.
- User RAM programs (BankSet U1) are also numbered from 000 to 059; Bank Select is 001 LSB.
- ROM programs (BankSet R2) are numbered from 000 to 059; Bank Select is 002 LSB.
- ROM programs (BankSet R3) are also numbered from 000 to 059; Bank Select is 003 LSB.
- ROM programs (BankSet R4) are also numbered from 000 to 059; Bank Select is 004 LSB.
- Sampled Sounds* (BankSet S8) are numbered from 000 to 009; Bank Select is 008 LSB.
- Sampled Sounds* (BankSet S9) are also numbered from 000 to 009; Bank Select is 009 LSB.

Refer to *Section 3 — MIDI Control Page Parameters* for more information on how the TS-12 receives program changes.

- Press the **Track Effects** button to get to the Effects Bus Routing page:

Effects Bus Routing Page

Range: VOICE, -FX1-, -FX2-, -DRY-, or -AUX-



On the Effects Bus Routing page, you can re-route the voices for each track without editing the sound itself. This may be useful when two sounds are split or layered, and the effect is not appropriate for both. Also this is used to assign a track to the AUX Outputs for separate processing or mixing. The available Effects Bus Routing options are:

- VOICE — uses the normal voice routing from the sound on the track
- FX1 — forces all voices to FX1
- FX2 — forces all voices to FX2
- DRY — forces all voices in a track to the DRY bus
- AUX — This bypasses the effects on all voices in a track, and allows you to process them separately by sending them directly to the AUX Outputs. Any track that has -AUX- selected will not be heard out of the Main outputs.

- Press the **Track Effects** button again to get to the Effects Controller page:

Effects Controller Page

Range: NO-CNTRL or CNTRL-FX

```

MODS MEGASTRINGS  HYPER-LOOP  TENOR-SAX
      CNTRL-FX      NO-CNTRL    NO-CNTRL

```

In effects which allow real-time control, it is sometimes desirable to limit which tracks send controller information to the effect. This is particularly true when using multiple MIDI input channels from a sequencer. If more than one track is set to CNTRL-FX, “controller fights” can occur. If set to NO-CNTRL, a track will remain routed to the effects, but its controllers (such as TIMBRE, WHEEL, PEDAL, etc.) will not modulate the effect.

- Press the **Track Effects** button again to get to the Effect Selector page. Here you can redefine the Effect Algorithm for use in the preset, sequence, or song.

Continued presses of the **Track Effects** button will scroll through the parameters related to the currently selected Effect Algorithm. These are identical to the effects parameters in the Programming section of the TS-12 (see *Section 7 — Effects Parameters* for descriptions of these parameters).

Tip: By double-clicking the **Track Effects** button, you can instantly bypass the effect. The effect bus routing is temporarily set to *BYP* on all tracks except those set to AUX. Only the dry signal will be heard. Double-clicking again will restore the previous effect bus routing settings.

Section 6 — Understanding Effects

This section offers a basic overview of the concepts involved in selecting, creating, editing, and understanding Effects. For more detailed descriptions of the actual effect parameters, refer to the following section.

Understanding TS-12 Effects

The TS-12 has a powerful built-in signal processor that can produce a variety of effects. More important, its functions are integrated into, rather than added onto, the rest of the synthesizer. The flexible bus routing scheme and extensive real-time control give the TS-12 its dynamic effects capability.

The TS-12 is equipped with an advanced digital signal processing system based on the ENSONIQ Signal Processor (ESP) chip. The ESP is designed specifically for digital audio signal processing, and in the TS-12 it works in tandem with a fourth-generation version of the Digital Oscillator Chip (DOC IV a.k.a. OTTO) and an external 16-bit digital-to-analog converter to provide a very high-quality output signal.

Digital effects processing capability has been designed to complement the advanced performance features of the TS-12, and all of the effects can have any parameter modulated by various performance controllers such as the Mod Wheel, channel pressure, and other user-definable controllers.

All effects are fully programmable and may be customized for particular applications. Effects are most often stored as part of a sound, although each preset may also have its own *override* effect, independent of the effects contained by the sounds within the preset. Each individual sequence and song also has an independent effect. The following sections describe each type of effect.

Program and Sampled Sound Effects

Each sound in the TS-12 contains an effect and a complete set of parameter values which determine how that effect will sound. The effect is present even if none of the voices in the sound are routed through the effect (e.g. all voices are sent to the DRY or AUX destination bus - see the Output page in *Section 9 — Program Parameters*). Whenever you save or write a sound, the effect settings are also saved with the sound.

The sound effect is displayed and edited by pressing the **Program Effects** button. These Effect Parameter pages are described in detail in *Section 7 — Effect Parameters*.

If the preset effect that is currently loaded and being heard is different than the sound effect that is being shown, then a flashing MUTE will appear in the lower left corner of the display.

Preset Effects

Each preset in the TS-12 also contains an effect and a complete set of effect parameter values. The effect is present even if none of the tracks in the preset are routed through the effect (e.g. all tracks are sent to the DRY or AUX destination bus - see *Section 5 — Preset/Track Parameters*). Whenever you save or write a preset, the effect settings are also saved with the preset.

The preset effect is the same as the effect contained in the primary selected sound in the preset, but can easily be changed to suit the needs of the preset more closely. This effect applies to all preset tracks (or their program voices) that are routed to either the FX1 or FX2 destination bus.

The preset effect is displayed and edited by pressing the **Track Effects** button in the Track Parameters section of the front panel, when the TS-12 is in either Sounds or Presets mode.

The top level page controls the re-routing of the voices without editing the sound itself, and is described in *Section 5 — Preset/Track Parameters*. The next page allows you to define which tracks

will send controller information to the effect. The remaining pages contain the effect parameters, which are specific to the effect type. These effect parameter pages are described in *Section 7 — Effect Parameters*.

Sequencer Effect

Like each of the presets in the TS-12, each sequence and song contains an effect and a complete set of effect parameter values. The effect is present even if none of the tracks in the sequence are routed through the effect (e.g. all tracks are sent to the DRY or AUX destination bus - see *Section 5 — Preset/Track Parameters*). This effect applies to all sequencer tracks (or their program voices) which are routed to either the FX1 or FX2 destination bus.

The effect is saved with each sequence or song. It will remain unaffected until a new song or sequence is selected, unless it is specifically edited. A special incoming MIDI program change message may be used to load new effects into a sequence in MULTI mode (see *Section 3 — MIDI Control Page Parameters*). The Copy function and a special mode of Copy Preset to Sequence can be used to replace the Sequence effect.

The sequencer effect is displayed and edited by pressing the **Track Effects** button in the Track Parameters section of the front panel, when the TS-12 is in Sequencer mode.

Selecting Effects

The first parameter of the Effects page is the effects selector. Changing this parameter causes a new effect to be selected, which in turn changes the type of parameters that will be available on the rest of the pages. Selecting a new effect algorithm will automatically set all of the effect parameters to their default values for the new effect. The available effects algorithms are:

00 DRY/BYPASSED	25 LARGE PLATE REVERB 1	50 EQ- -CHORUS + EQ- -DDL
0 DDL+CHORUS+REV	26 LARGE PLATE REVERB 2	51 FLANGER + REVERB
1 EQ- -DDL+CHORUS+REV	27 HALL REVERB 1	52 EQ- -FLANGER + DELAY
0 DELAYLFO+CHORUS+REV	28 HALL REVERB 2	53 PHASER + REVERB
3 ROTOSPKR+CHORUS+REV	29 HALL REVERB 3	54 PHASER + DELAY
4 DISTORT+CHORUS+REV	30 SMALL ROOM REVERB	55 EQ- -TREMOLO + DELAY
0 PARAM EQ+CHORUS+REV	31 MEDIUM ROOM REVERB	56 EQ- -VIBRATO + DELAY
6 ENV VCF+CHORUS+REV	32 LARGE ROOM REVERB	57 PITCH SHIFTER
7 DDL+PHLANGR+REV	33 TIGHT AMBIENCE	58 FAST PITCH SHIFTER
0 EQ- -DDL+PHLANGR+REV	34 WIDE AMBIENCE	59 PITCH SHIFTER + DELAY
9 DELAYLFO+PHLANGR+REV	35 NONLINEAR REVERB 1	60 ROTARY SPEAKER + REV
1 ROTOSPKR+PHLANGR+REV	36 NONLINEAR REVERB 2	61 SPEAKER CABINET
1 DISTORT+PHLANGR+REV	37 NONLINEAR REVERB 3	62 TUNABLE SPEAKER
2 PARAM EQ+PHLANGR+REV	38 GATED REVERB	63 GUITAR AMP 1
3 ENV VCF+PHLANGR+REV	39 REVERSE REVERB 1	64 GUITAR AMP 2
4 DDL+ROTOPSKR+REV	40 REVERSE REVERB 2	65 GUITAR AMP 3
5		

1 6	EQ- -DDL+ROTOSPKR+REV	41 STEREO DELAY + DELAY	66 VCF- -DISTORTION- -VCF
1 7	DELAYLFO+ROTOSPKR+REV	42 MULTITAP DELAY	67 WAH- -DISTORTION + REV
1 8	ROTOSPKR+ROTOSPKR+RE V	43 EQ- -STEREO DELAYLFO	68 FLNG- -CMP- -DIST + REV
1 9	DISTORT+ROTOSPKR+REV	44 EIGHT VOICE CHORUS	69 DISTORT + CHORUS- -REV
2 0	PARAM EQ+ROTOSPKR+REV	45 CHORUS + REVERB 1	70 PARAMETRIC EQ
2 1	ENV VCF+ROTOSPKR+REV	46 CHORUS + REVERB 2	71 EQ- -COMPRESSOR
22	PLATE + PLATE REVERBS	47 DDL- -CHORUS + REVRB 1	72 RUMBLE FILTER
23	PARAMETRIC EQ + PLATE	48 DDL- -CHORUS + REVRB 2	73 VAN DER POL FILTER
24	SMALL PLATE REVERB	49 EQ- -CHORUS + REVERB	

Tip: Double click the **Program Effects** button to return to the algorithm select page.

Tip: The names of the parallel effect algorithms are right justified to differentiate them from the other effect algorithms.

What is an Algorithm?

An algorithm is the basic signal processing building block in the TS-12. The word “effect” could be used instead of algorithm, but some algorithms can produce several sonic effects simultaneously. Each algorithm has a set of parameters used to control the effect(s) it produces. The values of these parameters are saved with the algorithm. Wherever applicable, we will refer to the TS-12 effects as *algorithms*.

Signal Routing Between Effects

If the algorithm consists of two or more different types of effects, the algorithm name has symbols that show how these different effect types are routed together. The routing symbols are:

- indicates a serial connection from the effect on the left into the effect on the right.
- + indicates a parallel connection between the effect on the left and the effect on the right.

For example, the EQ--TREMOLO + DELAY algorithm has a *serial* routing from the EQ into the tremolo effect (i.e. the output of the EQ always feeds into the Tremolo) , and a *parallel* routing between the tremolo and the digital delay (i.e. there is an input into the delay line).

Sounds and Presets

The complete effects setup, including the values of all effect parameters, is saved when you save a sound. It is *also* saved when you save a preset. The TS-12 tries to be smart about switching effects, since all sound must stop for an instant when it changes effects.

When are New Algorithms loaded into the ESP Chip?

Whenever a new algorithm is loaded into the ESP, the audio output will pause briefly, allowing the instructions which create the new algorithm to be loaded into the ESP. If an algorithm differs only by variation in parameter values, then this pause may not occur.

These are the rules that the TS-12 follows in deciding when to change algorithms:

- 1) When you select a primary sound from one of the Sound Bank pages, the algorithm saved in that sound will be loaded into the ESP, and you will hear the sound with its algorithm. If you layer a sound by double-clicking, its algorithm will not be loaded.
- 2) When you select or layer sounds/tracks from a preset or Track Parameter page, the algorithm is not changed.
- 3) When you change the sound on a track from Replace Track Sound mode (e.g. with the **Sounds** LED flashing), the algorithm will *not* be changed.

- 4) When you change the sound on a track by double-clicking the **Replace Track Sound** button (e.g. with the **Sounds** and the **Replace Track Sound** LED flashing), the algorithm *will* be changed.
- 5) When you select a preset, the algorithm saved in that preset will be loaded into the ESP.
- 6) When you select a song or sequence, the algorithm saved in that song or sequence will be loaded into the ESP.
- 7) Whenever you go from Sounds mode to Sequencer mode (by pressing **Seqs/Songs**) the sequencer algorithm is loaded. The same is true when going from Sequencer mode to Sounds mode (by pressing **Sounds**).
- 8) Saving either the sound or the preset will save the *current* algorithm.
- 9) Should you start editing a sound while an algorithm *other than its own* is active, a warning will appear, reminding you that you are not hearing the algorithm you are seeing or editing. This warning appears as MUTE, flashing in the lower left corner of the display.
- 10) When MIDI program changes 60-119 are received in MULTI or MONO B modes, the sequence or song effect algorithm will be loaded with the one in the program change.

Performance Control of Tracks in Preset or Sequencer Mode

When the TS-12 is in Presets or Sequencer mode, all the instruments in the internal memory are routed through the same global effect. In order to gain some individual control for each track, two additional sub-pages on the Track Effect page determine how each instrument will interact with the algorithm. The algorithm for the current preset, song, or sequence is edited by pressing the **Track Effects** button in the Track Parameters section of the front panel.

The first time it is pressed, it shows the Effects Output Routing parameter for each of the three tracks in a performance preset (or for 6 of the 12 tracks of the current song or sequence in Sequencer mode). The Effects Output Routing sub-page determines which of the Output Busses the track will be sent through. By using this parameter, you can give individual instruments different Dry/Wet or multiple effect mixes.

The second press shows the Effect Mod Controller page. This parameter determines whether or not the controllers of a particular track will be routed to control the effect. This is an important setting when in Presets or Sequencer mode; since all tracks are routed through the same effect, it could be confusing to have multiple instruments sending conflicting controller information to the effect. If more than one track is set to CNTRL-FX, “controller fights” can occur. If set to NO-CNTRL, a track will remain routed to the effects, but its controllers (such as the TIMBRE, PBEND, WHEEL, etc.) will not affect the track.

Subsequent presses reveal the effects programming parameters, which are identical to those found on the Program Effects page.

Programming Effects

The TS-12 algorithms are fully programmable. The first sub-page contains the effect selector. The effect selector is a little different than all of the other parameters. It controls how all of the other effect pages will be configured and displayed. When this parameter is changed, a new algorithm is selected which causes several important things to occur:

- a new algorithm is loaded, causing a brief pause in the audio output
- the effect parameter pages are redefined for the particular effect selected
- the effect parameter values are reset to their default settings for the effect

Tip: When editing the effect selector, it is possible to change the new effect type quickly and avoid the brief delay caused by the actions described above. Pass rapidly over the types between the old type and the new type, and then pause. The new effect will be recalled only after you stop changing the type.

Effect Variations

The first effect parameter page is similar for all of the effects (the display shows VARIATION=). It selects an Effect Variation, which feature various “preset” patches, letting you quickly access several set-ups within the same effect. Each algorithm has a predetermined amount of variations. Each of these variations is individually editable and can act as independent effect edit buffers. Each Effect Variation can have two different Modulation Sources, Destination parameters, and defined modulation ranges.

The Effects Busses

The output of every voice in the TS-12 is assigned to a stereo bus. A bus, like the bus of a mixing board, mixes together all the voices assigned to that bus into a single stereo pair. Of the four busses on the TS-12, two are inputs into the signal processor (FX1 and FX2), another is a direct path to the Main outputs which bypasses all effect processing (DRY) and the fourth is a direct path to the AUX outputs which also bypasses all effect processing (AUX). The Destination Bus assignment for each Voice is set on the Output page. The voice settings in a program can be overridden for each preset and sequencer track on the top-level of the Track Effects page.

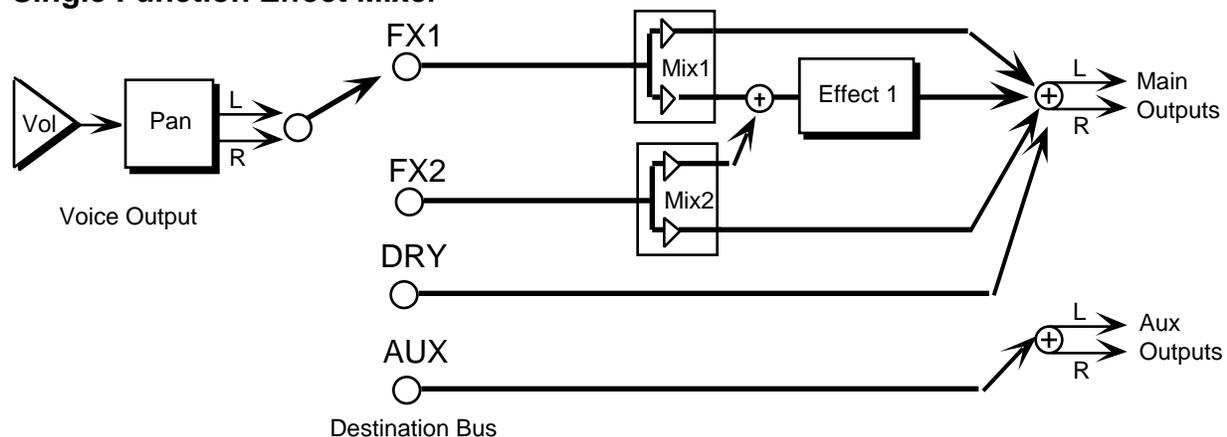
Tip: By double-clicking the **Track Effects** button, you can bypass the effect. However, any tracks routed to the AUX outputs will not be bypassed.

Effects Mixing

Almost all of the effects have separate mixing controls for the FX1 and FX2 busses. They are found on the next sub-page within the Effects page, and will have slightly different wording depending on the effect they're contained within.

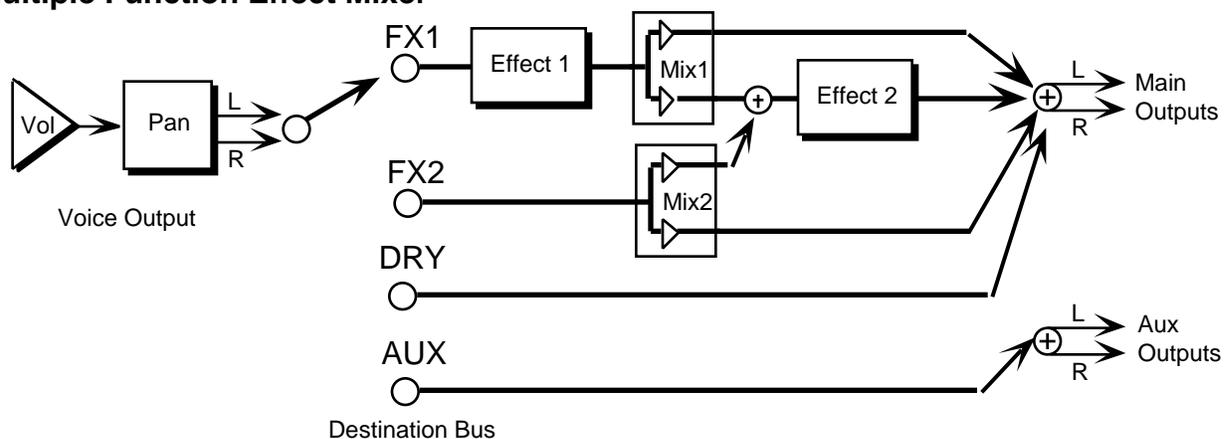
When an effect having a single processing function (such as reverb only) is selected, both busses FX1 and FX2 are routed to it. When using a dual or multi-effect, FX1 will generally route the signal through both or all effects, with FX2 routing only through the second effect. In all cases, a third bus labeled DRY is a dedicated dry path to the Main Outputs.

Single Function Effect Mixer



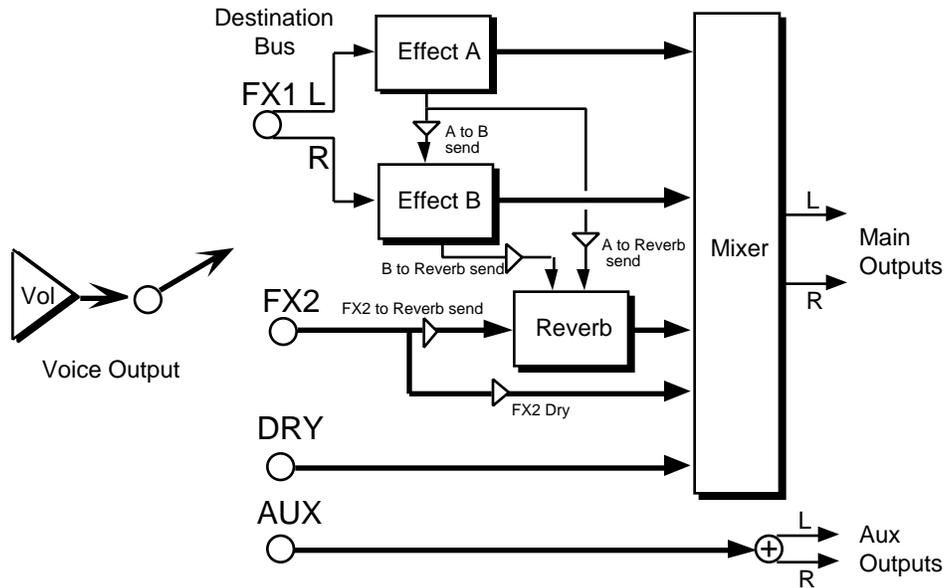
The above illustration shows the effects busses and the output mixing. Every voice is assigned to one of the four stereo busses, which go around or through the effects processing. In all of the effects routing diagrams, the heavy lines are stereo paths.

Multiple Function Effect Mixer



When the selected algorithm is a *combined* effect that has more than one signal processing function (such as chorus and reverb), the FX1 bus feeds Effect 1, and the FX2 bus feeds Effect 2. The FX2 Mix control sets the amount of Effect 2 (usually reverb) for voices assigned to that bus. FX1 Mix controls the amount of the output from Effect 1 sent to Effect 2 rather than directly to the output. By setting this control to its extremes, you can arrange the two effects to be either in series or in parallel. The majority of combined effects follow this topology. If a specific algorithm uses a different topology, it will be explained in the Effect Parameters section.

Parallel Effect Mixer



All of the parallel effect algorithms follow the topology shown in the illustration above. The heavy lines are stereo paths. Voices assigned to FX1 (on the Output Page) will be sent to Effect A, if the PAN parameter is set to -99 (hard left) or sent to Effect B, if the PAN parameter is set to +99 (hard right). Note that by setting the PAN parameter to 50, you can create a *parallel* routing between Effect A and Effect B. There is a SEND parameter allowing a serial connection from Effect A into Effect B. There is a SEND parameter allowing a serial connection from Effect A into the Reverb, and another parameter allowing a serial connection from Effect B into the Reverb. Voices assigned to FX2 (on the Output Page) will send a stereo signal to the reverb. The FX- -REVRB parameter allows you to define how much of the signal you want sent into the Reverb. There is also a DRY parameter (on the SEND sub-page) from FX2 allowing you to define how much of the FX2 signal you want to completely bypass the Reverb. Any voices assigned to the DRY Destination-Bus (on the Output page) will go through the mixer to the Main Output jacks. Any voices assigned to the AUX Destination-Bus will go directly to the AUX Output jacks, without any effects processing.

Selectable Effect Modulation Parameters

All of the algorithms allow real-time control of selectable parameters and share common modulation control parameters. The Modulation Control parameters are always the last parameters on the algorithm sub-pages:

MOD-1 SRC — Modulation Source 1 Range: (described below)

MOD-2 SRC — Modulation Source 2 Range: (described below)

These parameters select the modulation sources used to modulate the parameter Destinations. Each Effect Variation has a choice of two discrete mod sources.

Modulators that can be applied to the Effects

The following modulation sources are available to alter the effects in performance:

<u>Mod Source</u>	<u>Modulation effect derived from</u>
WHEEL	the value of the mod wheel
PBEND	the value of the pitch wheel
PEDAL	the value of the Pedal • CV input
TIMBR	the value of the TIMBRE parameter for the track
XCTRL	the value of the XCTRL (external MIDI controller) parameter for the track
PRESS	the channel pressure value for the track
KEYBD	the number of the last key played
VELOC	the average velocity of all keys played
KEYDN	on when any keys are pressed; otherwise off
PATCH	four values (0, 32, 64, 127) for the four button states
SUSTN	on when the assigned foot switch is held down (and SUSTAIN is selected as a FOOT-SW controller on the System sub-page); otherwise off
SOSTU	on when the assigned foot switch is held down (and SOSTENUTO is selected as a FOOT-SW controller on the System sub-page); otherwise off
FX-SW	on when assigned foot switch is held down (and FX-SW-MOD is selected as a FOOT-SW controller on the System sub-page); otherwise off
OFF	no modulation

For more information about the Modulation Sources, see *Section 8 — Understanding Programs*.

DEST — Mod1 Destination Parameter Range: varies (selected parameter name)

DEST — Mod2 Destination Parameter Range: varies (selected parameter name)

The Destination parameters select which effect parameters will be modulated by the modulation sources. The choice of parameters varies depending on the selected effect. Any parameter within an algorithm can be selected. Each Effect Variation has a choice of two different mod destinations. You cannot edit a parameter when it is assigned as a modulator destination. Disabling modulation of a parameter will restore its saved value.

MIN — Mod 1 Param Range Minimum Range: varies (based on DEST parameter range)

MAX — Mod 1 Param Range Maximum Range: varies (based on DEST parameter range)

MIN — Mod 2 Param Range Minimum Range: varies (based on DEST parameter range)

MAX — Mod 2 Param Range Maximum Range: varies (based on DEST parameter range)

These four parameters set the minimum and maximum amount (based on the selected Destination parameter's range) that the Mod Destination will be modulated by the Mod Source. Inverting the amounts will also invert the Mod effect.

Remember

In order for the effect modulation to work for the selected track, the Effect Mod Control parameter on the Track Effects sub-page must be set to CNTRL-FX.

Note: When an effect algorithm parameter is selected to be modulated, that parameter can no longer be edited. If you want to edit the parameter, set the Modulation Source (SRC) to *OFF*. To see the current value that the modulator has set it to, reselect the parameter.

Section 7 — Effect Parameters

This section offers detailed descriptions of the sub-pages and parameters used in selecting, creating, and editing effects. For a basic overview of the concepts involved, refer to the previous section.

About Effect Parameters

The effect algorithms (shown in reverse type) described in this section have various sub-pages. Sub-pages are a group of parameters associated with the effect algorithm. Some of the parameters are common to many effect algorithms and some are specific to a particular effect algorithm. The first sub-page of parameters is almost identical for all of the algorithms. It contains the name of the effect algorithm and variations of this algorithm. The remaining sub-pages are variable and contain specific parameters that are relevant only to that effect. All of these parameters are programmable and can be used to customize each effect algorithm.

Effect Modulation Parameters

The Effect Modulation parameters are identical for all the algorithms, and are explained in detail in *Section 6 — Effect Concepts*.

00 DRY/BYPASSED

This utility algorithm routes FX-1 and FX-2 permanently dry without any effects processing. This is useful when you want to hear a sound without any effects coloration.

MIX FX-1 and FX-2

Ranges: 00 to 99

These parameters control the mix of silence with a dry audio signal. The FX-1 and FX-2 parameters can be assigned different levels, and used as volume mix controllers for each track in a preset, sequence, or song. 00 is silent and 99 is full volume. By assigning the modulation controllers to these parameters, you can change volume mixes of the tracks in real-time.

Parallel Effects

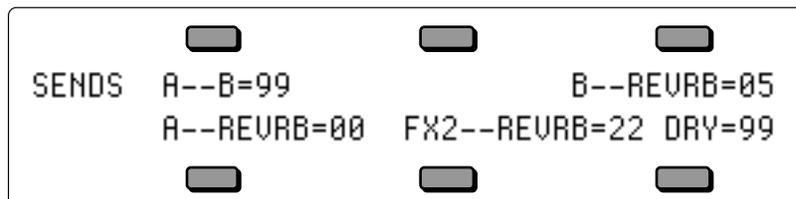
The first 21 algorithms in the TS-12 are called “parallel effects” and allow several effect types to be used at the same time. These algorithms can be very useful in Presets and Sequencer mode, where you would like different effects processing for each track. The key to parallel effects is how the voices are routed and how they are panned (on the Output page). Many of the parallel effect parameters are identical, and are described the first time they appear.

01 DDL+CHORUS+REV

This parallel effect combines a digital delay with a chorus and a plate reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (DDL)
- Voices assigned to FX1 (and panned right) are sent to Effect B (CHORUS)
- Voices assigned to FX2 are sent to a plate reverb (REV)

For more information about parallel effects routing, refer to the previous section.



- SENDS A- -B** Range: 00 to 99
Controls the amount of Effect A (DDL) being sent into Effect B (the chorus). A setting of 99 would yield a serial connection between Effect A and the chorus for voices sent to FX1 and panned hard left (on the Output page).
- B- -REVRB** Range: 00 to 99
Controls the amount of Effect B (CHORUS) being sent into the reverb. This would allow you to add reverb to voices assigned to FX1 and panned hard right. A setting of 99 would yield a serial connection between the CHORUS and the reverb for voices sent to FX1 and panned hard right (on the Output page).
- A- -REVRB** Range: 00 to 99
Controls the amount of Effect A (DDL) being sent into the reverb. This would allow you to add reverb to voices assigned to FX1 and panned hard left, without having to add any chorusing.
- FX2- -REVRB** Range: 00 to 99
Defines how much of the voices assigned to FX2 (on the Output page) will be sent into the Reverb. This allows you to fine tune the amount of reverb coloration you want to add to your voices.
- DRY** Range: 00 to 99
This parameter allows you to define how much of the FX2 signal you want to completely bypass the Reverb. By setting this parameter to 99 and the FX2- -REVB parameter to 00, you can assign voices to be completely dry.
- DDL MIX** Range: 00 to 99
Controls the mix between the original signal and the delay. Setting this parameter to 00 will allow only the unprocessed signal to be heard, while a setting of 99 will eliminate it completely, with only the delay portion remaining.
- LEVEL** Range: 00 to 99
Adjusts the volume of the delayed signals against the original dry signal. A level of 00 will offer no audible delay.
- PAN** Range: -99 to +99
Determines the location of the delays in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right. If set to either hard left or hard right, the delayed signal for the opposite side is inaudible.
- DDL REGEN L** Range: -99 to +99
Determines the amount of signal that will be fed from the output of the left delay back into the input, increasing the number of repeats in the delay. A setting of 99 would offer an infinite delay.
- DAMPING** Range: 00 to 99
Controls the cutoff of a low pass filter on the feedback signal, which adjusts the amount of damping to the feedback signals. The higher the number, the more the signals are dampened.
- DELAY TIME L and R** Ranges: 0000 to 1000 msec
Sets the amount of delay time for the independent delays. Each value increases the delay time by 1 millisecond. Experiment with different settings to find the right mix for your sound source and application. Some interesting effects can be implemented by using a real-time modulation controller for these parameters.

- CHORUS MIX** Range: 00 to 99
Controls the Dry/Wet mix within the chorus itself. For starters, we recommend settings of 50.
- LEVEL** Range: 00 to 99
Adjusts the volume of the chorused signal. A level of 00 will offer no audible signal.
- WET PAN** Range: -99 to +99
Determines the location of the chorused signal in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.
- DRY PAN** Range: -99 to +99
Determines the location of the dry signal in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.
- CHORUS CENTER** Range: 000 to 127
Controls the nominal delay time of the chorus about which the delay modulation occurs. Adjusting this parameter will change the tonal character of the effect. This delay time is not related to the REGEN or the DDL delays.
- RATE** Range: 000 to 127
Controls the four rates of modulation of the delay time of the chorus. The delay modulation produces vibrato and tremolo.
- WIDTH** Range: 000 to 127
Controls the depth of vibrato and tremolo.
- LFO SPREAD** Range: 000 to 128
Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.
- REGEN** Range: -99 to +99
Controls the amount of feedback applied to the chorus. The sign of the value determines the polarity of the feedback. Feedback accentuates the complexity of the “swept” signal.
- REVERB DECAY TIME** Range: 0.40 to 140.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.
- PRE-DLY TIME** Range: 0000 to 0300 msec
This parameter creates a time delay before the original signal is fed into the reverb. The range is based in milliseconds.
- HF - DAMPING** Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.
- BANDWIDTH** Range: 00 to 99
Acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.
- DEFINITION** Range: 00 to 99
Controls the rate at which echo density increases with time. Higher values can cause the echo

density to build at a rate that exceeds the decay rate. For the best performance, try to select the highest value that works with your sound source.

DIFFUSION

Range: 00 to 99

These parameters determine whether the early reflections will appear as a series of discrete echoes (lower values) or will be more diffused (higher values).

02 EQ- -DDL+CHORUS+REV

This parallel effect combines a parametric EQ and a DDL with a chorus and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (EQ- -DDL)
- Voices assigned to FX1 (and panned right) are sent to Effect B (CHORUS)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

EQDDL MIX

Range: 00 to 99

Controls the mix between the original signal and the EQ into the delay. Setting this parameter to 00 will allow only the unprocessed signal to be heard, while a setting of 99 will eliminate it completely, with only the delay portion remaining.

LEVEL

Range: 00 to 99

Adjusts the volume of the delayed signals against the original dry signal. A level of 00 will offer no audible delay.

PAN

Range: -99 to +99

Determines the location of the delays in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right. If set to either hard left or hard right, the delayed signal for the opposite side is inaudible.

EQ FC

Range: 0 Hz to 15 KHz

Sets the center frequency of the parametric EQ.

BW

Range: 0 Hz to 15 KHz

Sets the bandwidth for the center frequency.

LEVEL

Range: -99 to +48

Sets the amount of boost or cut applied to the parametric.

EQDDL REGEN

Range: -99 to +99

Controls the amount of regen (regeneration) applied to the delay time taps. The sign of the value determines the polarity of the regen.

DAMPING

Range: 00 to 99

Adjusts the cutoff of a low pass filter on the feedback signal, which controls the amount of damping to the feedback signals. The higher the number, the more the signals are damped.

TIME

Range: 1 msec to 1K (1 sec)

Determines the amount of time between the input signal and the delay outputs.

For a complete description of the remaining parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

03 DELAYLFO+CHORUS+REV

This parallel effect combines a digital delay that provides LFO modulation with a chorus and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (DELAYLFO)
- Voices assigned to FX1 (and panned right) are sent to Effect B (CHORUS)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

- DELAYLFO LEVEL** Range: 00 to 99
Controls the volume level of the original signal and the delay. Setting this parameter to 00 will eliminate the audio signal.
- PAN** Range: -99 to +99
Determines the location of the delays in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right. If set to either hard left or hard right, the delayed signal for the opposite side is inaudible.
- WET** Range: 00 to 99
This parameter controls the volume of the delayed signal only. Setting this parameter to 00 will eliminate the delay portion completely.
- DRY** Range: 00 to 99
This parameter allows you to define how much of the FX1 signal you want to completely bypass the Delay LFO. Setting this parameter to 00 will eliminate the dry signal. By setting this parameter to 99 and the WET parameter to 00, you can assign voices to be completely dry.
- DELAY LFO CENTER** Range: 000 to 127
Controls the nominal delay time of the LFO about which the delay modulation occurs. Adjusting this parameter will change the tonal character of the effect. Higher values offer a longer delay time.
- RATE** Range: 000 to 127
Controls the rate of pitch modulation which is the LFO. To achieve a chorusing effect, this rate must be very slow.
- WIDTH** Range: 000 to 127
Controls the excursion of pitch modulation. Since the rate is usually very slow, the width is usually large.
- R LFO PHASE** Range: 00 to 99
When set to 00, the left and right choruses will modulate their detunes together. When set to 99 the detune on the right channel will go up while the detune on the left will go down, creating an out-of-phase effect.
- REGEN** Range: -99 to +99
Controls the amount of regen (regeneration) applied to the delay time taps. The sign of the value determines the polarity of the regen.

For a complete description of the remaining parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

04 ROTOSPKR+CHORUS+REV

This parallel effect combines a rotary speaker with a chorus and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (ROTOSPKR)
- Voices assigned to FX1 (and panned right) are sent to Effect B (CHORUS)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

- STEREO** Range: OFF or ON
When set to OFF, the same roto-speaker signal is heard in both channels. When set to ON, the signal is 180° out-of-phase, to create stereo movement.
- LEVEL** Range: 00 to 99
Adjusts the volume of the rotary speaker signal. A level of 00 will offer no audible signal.
- PAN** Range: -99 to +99
Determines the location of the rotary speaker signal in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.
- AM DEPTH** Range: 00 to 99
Controls how much the volume will fade away as the speaker rotates away from the listener. Higher values will create a deeper rotating speaker effect.
- FM DEPTH** Range: 00 to 99
Controls the amount of detuning applied to the rotating speaker. This can be used to create a “doppler” effect.
- ROTO SLOW** Range: 00 to 99
Determines the rate of the rotary speaker when in the “Slow” setting. ROTO SLOW determines the manual level for the rotary speaker rate when SPEED= SLOW, or when the selected modulator is at zero output level. Again, the higher the value, the faster the rate.
- FAST** Range: 00 to 99
Determines the rate of the rotary speaker when in the “FAST” setting. The higher the value, the faster the rate.
- INERTIA** Range: 00 to 99
Determines how long it will take for the rotor effect to speed up and slow down after switching from fast to slow or vice versa. Adjust this parameter to simulate the effect of the rotary speaker gradually picking up speed.
- SPEED** Range: SLOW or FAST
Determines how the rotary speaker will switch between slow and fast speeds. The behavior of the switch accurately reflects an actual rotary speaker, taking time to speed up or slow down, based on the value of the INERTIA parameter (see previous description). Any effect modulator can act as the SPEED controller. How the modulators will switch the rotor speed fall into two categories:
- WHEEL, PBEND, PEDAL, TIMBR, XCTRL, PRESS, KEYBD, and VELOC — These modulation sources act like a switch to turn on or off the fast rotor speed. To reverse the polarity of the switch, set ROTOR SLOW faster than ROTOR FAST.
 - KEYDN, PATCH, SUSTN, SOSTU, FX-SW — These modulation sources toggle the rotor speed between slow and fast. Every time the modulation source moves from zero in a positive direction, the rotating speaker effect changes speeds from slow to fast or fast to slow.

For a complete description of the remaining parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

05 DISTORT+CHORUS+REV

This parallel effect combines a raspy distortion with a chorus and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (DISTORT)
- Voices assigned to FX1 (and panned right) are sent to Effect B (CHORUS)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

DIST MIX Range: 00 to 99

Controls the mix between the original signal and the distortion. Setting this parameter to 00 will allow only the unprocessed signal to be heard, while a setting of 99 will eliminate it completely, with only the distortion portion remaining.

LEVEL Range: 00 to 99

Controls the input level to the pre-amp, to eliminate the possibility of clipping boosted signals.

PAN Range: -99 to +99

Determines the location of the distortion in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.

PREAMP Range: 00 to 99

Adjusts the amount of boost or cut applied to the incoming signal. We recommend lower settings, since these emulations were optimized for distortion there. Lower preamp gains will result in less distortion, while higher preamp gains will yield clipping distortion. For low preamp gain, it may be desirable to use low tube bias values.

MAIN Range: 00 to 99

Controls the output level of the main amp after saturation, but before the filter.

BIAS Range: -99 to +99

Controls the emphasis of even to odd harmonics which determines the tone of the amp; mid values emphasize even harmonics and offer a warmer (“glowing tube”) sound, while the highest values may sound like tubes going bad. For low preamp gain, it may be desirable to use low tube bias values, because this more closely imitates the operation of a real amplifier.

TONE Range: 0000 to 8000

Controls the cutoff frequency. This is much like a tone control on a guitar amp. By applying a real-time controller to modulate this parameter, you can create a wah-pedal effect.

RESONANCE Range: 00 to 99

Controls the bandwidth of the filter. Higher settings yield a narrower bandwidth.

For a complete description of the remaining parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

06 PARAM EQ+CHORUS+REV

This parallel effect combines a parametric EQ with a chorus and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (PARAM EQ)
- Voices assigned to FX1 (and panned right) are sent to Effect B (CHORUS)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

INPUT Range: 00 to 99
Allows you to adjust the input level trim to the EQs to eliminate the possibility of clipping boosted signals.

OUTPUT Range: 00 to 99
Adjusts the output volume after the parametric EQ. With the LEVEL, BASS LEVEL, and TREBLE LEVEL set to high values, the OUTPUT parameter could be used to create a raspy distortion effect.

PAN Range: -99 to +99
Determines the location of the EQ in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.

MID FC Range: 00000 to 15000
Sets the center of the mid-frequency parametric.

BW Range: 0 to 15K
This parameter is a bandwidth control that determines the width of the resonant peak at the mid-frequency band. By lowering the value, you can produce a narrower bandwidth.

LEVEL Range: -99 to +48 dB
Sets the amount of boost or cut applied to this mid-frequency parametric.

BASS LEVEL Range: -99 to +48 dB
Sets the amount of boost or cut applied to a 0 to 80Hz low-shelving filter.

TREBLE LEVEL Range: -99 to +48 dB
Sets the amount of boost or cut applied to a 10 to 15K high-shelving filter.

For a complete description of the remaining parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

07 ENV VCF+CHORUS+REV

This parallel effect combines a voltage control filter with a chorus and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (ENV VCF)
- Voices assigned to FX1 (and panned right) are sent to Effect B (CHORUS)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

- VCF FC** Range: 000 to 127
Determines the filter cut off-frequency. Higher values have a brighter sound. This parameter can be modulated, using a CV Pedal for a wah-wah pedal effect. To use as an EQ, set the desired value and make sure the ENV AMT is 0. To use as the auto-wah, set this parameter to a low value and turn on ENV AMT.
- LEVEL** Range: 00 to 99
Controls the output level of the Voltage control filter.
- PAN** Range: -99 to +99
Determines the location of the VCF in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.
- BW** Range: 00 to 99
Determines the level and width of the resonant peak at the filter cutoff point. While the VCF FC parameter determines where (at what frequency) this peak will occur, the BW setting controls the presence of the peak. This setting is important for the auto-wah effect.
- ENV AMT** Range: 0 to 15
Controls the peak frequency at the highest point of the attack. When set to 0, the ATTACK, DECAY, SUSTN, REL, and TRIG parameters have no effect.
- KBD AMT** Range: 0 to 15
Keyboard tracking amount — the cutoff frequency will track based on the KYB AMT range. Set this parameter to work with your signal.
- ATTACK** Range: 50 μ sec to 10.0 sec
Sets the attack of the envelope follower (i.e. determines how closely the attack is followed) once the incoming signal has been detected. Generally the attack should be short.
- DECAY** Range: 50 μ sec to 10.0 sec
Determines the amount of time after the attack time that the VCF will decay.
- SUSTN** Range: 00 to 63
Determines the amount of time the VCF will sustain before it decays.
- RELEASE** Range: 50 μ sec to 10.0 sec
Sets the amount of time after the incoming signal has ceased for the envelope follower to shut down. Generally these times are longer than the attack times.
- TRIG** Range: SINGLE or MULTI
Determines whether the VCF will retrigger with each key-event or not.

For a complete description of the remaining parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

08 DDL+PHLANGR+REV

This parallel effect combines a digital delay with a phlanger (a combination phaser and flanger effect) and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (DDL)

- Voices assigned to FX1 (and panned right) are sent to Effect B (PHLANGR)
- Voices assigned to FX2 are sent to the reverb (REV)

- SENDS A- -B** Range: 00 to 99
Controls the amount of Effect A (DDL) being sent into Effect B (the phlanger). A setting of 99 would yield a serial connection between Effect A and the PHLANGR for voices sent to FX1 and panned hard left (on the Output page).
- B- -REVRB** Range: 00 to 99
Controls the amount of Effect B (PHLANGR) being sent into the reverb. This would allow you to add reverb to voices assigned to FX1 and panned hard right. A setting of 99 would yield a serial connection between the PHLANGR and the reverb for voices sent to FX1 and panned hard right (on the Output page).
- A- -REVRB** Range: 00 to 99
Controls the amount of Effect A (DDL) being sent into the reverb. This would allow you to add reverb to voices assigned to FX1 and panned hard left, without having to add any phasing/flanging.
- FX2- -REVRB** **PAN**
DRY **DDL REGEN L**
DDL MIX **DAMPING**
LEVEL **DELAY TIME L and R**
For a complete description of these parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.
- PHLANGR MIX** Range: -99 to +99
Controls the Dry/Wet mix within the phlanger itself.
- LEVEL** Range: 00 to 99
Adjusts the volume of the phlanger signal. A level of 00 will offer no audible signal.
- PAN** Range: -99 to +99
Determines the location of the phlanger signal in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.
- RATE** Range: 000 to 127
Controls the rates of modulation of the phlanger.
- REGEN** Range: -99 to +99
Controls the amount of feedback applied to the phlanger. The sign of the value determines the polarity of the feedback.
- PHASE CENTER** Range: -127 to +127
Controls the center of the phaser width.
- WIDTH** Range: 000 to 127
Controls the amount of modulation applied to phaser poles.
- FLANGER CENTER** Range: 000 to 127
Controls the center of the flanger width.
- WIDTH** Range: 000 to 127
Controls the range of the high to low-frequency sweep in the flanger effect.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

09 EQ- -DDL+PHLANGR+REV

This parallel effect combines a parametric EQ into a digital delay with a phlanger (a combination phaser and flanger effect) and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (EQ- -DDL)
- Voices assigned to FX1 (and panned right) are sent to Effect B (PHLANGR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the EQ- -DDL parameters, refer to the EQ- -DDL+CHORUS+REV algorithm found earlier in this section.

For a complete description of the PHLANGR parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

10 DELAYLFO+PHLANGR+REV

This parallel effect combines a digital delay that provides LFO modulation with a phlanger (a combination phaser and flanger effect) and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (DELAYLFO)
- Voices assigned to FX1 (and panned right) are sent to Effect B (PHLANGR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the DELAYLFO parameters, refer to the DELAYLFO+CHORUS+REV algorithm found earlier in this section.

For a complete description of the PHLANGR parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

11 ROTOSPKR+PHLANGR+REV

This parallel effect combines a rotary speaker with a phlanger (a combination phaser and flanger effect) and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (ROTOPSKR)
- Voices assigned to FX1 (and panned right) are sent to Effect B (PHLANGR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the ROTOSPKR parameters, refer to the ROTOSPKR+CHORUS+REV algorithm found earlier in this section.

For a complete description of the PHLANGR parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

12 DISTORT+PHLANGR+REV

This parallel effect combines a distortion with a phlanger (a combination phaser and flanger effect) and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (DISTORT)
- Voices assigned to FX1 (and panned right) are sent to Effect B (PHLANGR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the DISTORT parameters, refer to the DISTORT+CHORUS+REV algorithm found earlier in this section.

For a complete description of the PHLANGR parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

13 PARAM EQ+PHLANGR+REV

This parallel effect combines a parametric EQ with a phlanger (a combination phaser and flanger effect) and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (PARAM EQ)
- Voices assigned to FX1 (and panned right) are sent to Effect B (PHLANGR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the PARAM EQ parameters, refer to the PARAM EQ+CHORUS+REV algorithm found earlier in this section.

For a complete description of the PHLANGR parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

14 ENV VCF+PHLANGR+REV

This parallel effect combines a voltage control filter with a phlanger (a combination phaser and flanger effect) and a reverb. The second sub-page (not user-programmable) shows how this parallel effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (ENV VCF)
- Voices assigned to FX1 (and panned right) are sent to Effect B (PHLANGR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the ENV VCF parameters, refer to the ENV VCF+CHORUS+REV algorithm found earlier in this section.

For a complete description of the PHLANGR parameters, refer to the DDL+PHLANGR+REV algorithm found earlier in this section.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

15 DDL+ROTOSPKR+REV

This parallel effect combines a digital delay with a rotary speaker effect and a reverb. The second sub-page (not user-programmable) shows how this effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (DDL)
- Voices assigned to FX1 (and panned right) are sent to Effect B (ROTOSPKR)
- Voices assigned to FX2 are sent to the reverb (REV)

SENDS A- -B Range: 00 to 99

Controls the amount of Effect A (DDL) being sent into Effect B (the rotary speaker). A setting of 99 would yield a serial connection between Effect A and the rotary speaker effect for voices sent to FX1 and panned hard left (on the Output page).

B- -REVRB Range: 00 to 99

Controls the amount of Effect B (ROTOSPKR) being sent into the reverb. This would allow you to add reverb to voices assigned to FX1 and panned hard right. A setting of 99 would yield a serial connection between the ROTOSPKR and the reverb for voices sent to FX1 and panned hard right (on the Output page).

A- -REVRB Range: 00 to 99
 Controls the amount of Effect A (DDL) being sent into the reverb. This would allow you to add reverb to voices assigned to FX1 and panned hard left, without having to add any of the rotary speaker effect.

FX2- -REVRB **PAN**
DRY **DDL REGEN L**
DDL MIX **DAMPING**
LEVEL **DELAY TIME L and R**
 For a complete description of these parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

ROTO STEREO Range: OFF or ON
 Selects either a stereo or mono rotary speaker effect.

LEVEL Range: 00 to 99
 Adjusts the volume of the rotary speaker signal. A level of 00 will offer no audible signal.

PAN Range: -99 to +99
 Determines the location of the rotary speaker signal in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.

AM DEPTH Range: 00 to 99
 Controls how much the volume will fade away as the speaker rotates away from the listener. Higher values will create a deeper rotating speaker effect.

FM DEPTH Range: 00 to 99
 Controls the amount of detuning applied to the rotating speaker. This can be used to create a “doppler” effect.

ROTO SLOW Range: 00 to 99
 Determines the rate of the rotary speaker when in the “Slow” setting. ROTO SLOW determines the manual level for the rotary speaker rate when SPEED= SLOW, or when the selected modulator is at zero output level. Again, the higher the value, the faster the rate.

FAST Range: 00 to 99
 Determines the rate of the rotary speaker when in the “Fast” setting. The higher the value, the faster the rate.

INERTIA Range: 00 to 99
 Determines how long it will take for the rotor effect to speed up and slow down after switching from fast to slow or vice versa. Adjust this parameter to simulate the effect of the rotary speaker gradually picking up speed.

SPEED Range: SLOW or FAST
 Determines how the rotary speaker will switch between slow and fast speeds. The behavior of the switch accurately reflects an actual rotary speaker, taking time to speed up or slow down, based on the value of the INERTIA parameter (see previous description). Any effect modulator can act as the SPEED controller. How the modulators will switch the rotor speed fall into two categories:

- WHEEL, PBEND, PEDAL, TIMBR, XCTRL, PRESS, KEYBD, and VELOC — These modulation sources act like a switch to turn on or off the fast rotor speed. To reverse the polarity of the switch, set ROTOR SLOW faster than ROTOR FAST.

- KEYDN, PATCH, SUSTN, SOSTU, FX-SW — These modulation sources toggle the rotor speed between slow and fast. Every time the modulation source moves from zero in a positive direction, the rotating speaker effect changes speeds from slow to fast or fast to slow.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

16 EQ- -DDL+ROTOSPKR+REV

This parallel effect combines a parametric EQ into a digital delay with a rotary speaker effect and a reverb. The second sub-page (not user-programmable) shows how this effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (EQ- -DDL)
- Voices assigned to FX1 (and panned right) are sent to Effect B (ROTOSPKR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+ROTOSPKR+REV algorithm found earlier in this section.

For a complete description of the EQ- -DDL parameters, refer to the EQ- -DDL+CHORUS+REV algorithm found earlier in this section.

For a complete description of the ROTO parameters, refer to the DDL+ROTOSPKR+REV algorithm found earlier in this section.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

17 DELAYLFO+ROTOSPKR+REV

This parallel effect combines a digital delay that provides LFO modulation with a rotary speaker effect and a reverb. The second sub-page (not user-programmable) shows how this effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (DELAY LFO)
- Voices assigned to FX1 (and panned right) are sent to Effect B (ROTOSPKR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+ROTOSPKR+REV algorithm found earlier in this section.

For a complete description of the DELAYLFO parameters, refer to the DELAYLFO+CHORUS+REV algorithm found earlier in this section.

For a complete description of the ROTO parameters, refer to the DDL+ROTOSPKR+REV algorithm found earlier in this section.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

18 ROTOSPKR+ROTOPSKR+REV

This parallel effect combines a rotary speaker with another rotary speaker effect and a reverb. The second sub-page (not user-programmable) shows how this effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (ROTOPSKR)
- Voices assigned to FX1 (and panned right) are sent to Effect B (ROTOPSKR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS and the ROTO parameters, refer to the DDL+ROTOPSKR+REV algorithm found earlier in this section.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

19 DISTORT+ROTOPSKR+REV

This parallel effect combines a raspy distortion with a rotary speaker and a reverb. The second sub-page (not user-programmable) shows how this effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (DIST)
- Voices assigned to FX1 (and panned right) are sent to Effect B (ROTOPSKR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+ROTOPSKR+REV algorithm found earlier in this section.

For a complete description of the DISTORT parameters, refer to the DISTORT+CHORUS+REV algorithm found earlier in this section.

For a complete description of the ROTO parameters, refer to the DDL+ROTOPSKR+REV algorithm found earlier in this section.

For a complete description of the remaining Reverb parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

20 PARAM EQ+ROTOPSKR+REV

This parallel effect combines a parametric EQ with a rotary speaker and a reverb. The second sub-page (not user-programmable) shows how this effect is routed:

- Voices assigned to FX1 (and panned left) are sent to Effect A (PARAM EQ)
- Voices assigned to FX1 (and panned right) are sent to Effect B (ROTOPSKR)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL+ROTOPSKR+REV algorithm found earlier in this section.

For a complete description of the PARAM EQ parameters, refer to the PARAM EQ+CHORUS+REV algorithm found earlier in this section.

For a complete description of the ROTOSPKR parameters, refer to the DDL+ROTOPSKR+REV algorithm found earlier in this section.

- PRE-DLY TIME** Range: 0000 to 0300 ms
Controls the amount of time it takes for the input signal to be presented to the plate reverb. A value of 0000 would offer no delay.
- HF - DAMPING** Range: 00 to 99
Increasing the value of this parameter will gradually filter out increasing amounts of high-frequency energy. Higher values yield an abrupt decay. Controls the cut off of a low pass filter in series with the decay within the definition.
- BANDWIDTH** Range: 01 to 99
Acts as a low-pass filter on the output of the plate reverbs, controlling the amount of high frequencies present. The higher the setting, the more high frequencies are allowed to pass through, offering a brighter ringing sound. Some interesting effects can be created by using a mod controller over a large range.
- DETUNE - RATE** Range: 00 to 99
Controls the LFO rate of detuning incorporated within the reverb. Detuning creates a slight pitch shift into the reverberated signal, giving it a more natural sounding decay by breaking up resonant nodes.
- DEPTH** Range: 00 to 99
Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.
- DEFINITION** Range: 00 to 99
Controls the rate at which echo density increases with time. Higher values can cause the echo density to build at a rate that exceeds the decay rate. Try to select the highest value that works with your sound source for the best performance.
- DIFFUSION** Ranges: 00 to 99
The two diffusion parameters smear the input signal to create a smoother sound. Lower values will cause impulse sounds to appear as a series of discrete echoes, while higher values tend to increase the smear, making the echoes less apparent.
- REVERB2 - DECAY TIME**
PRE-DLY TIME
HF - DAMPING
BANDWIDTH
DETUNE - RATE
DEPTH
DEFINITION
DIFFUSION
These parameters are identical to the previous ones, and allow you to create a completely independent plate reverb assigned to FX2.

23 PARAMETRIC EQ + PLATE

This dual effect algorithm combines a parametric EQ with a plate reverb, allowing independent effects processing.

- FX1- -EQ** Range: 00 to 99
Controls the volume mix for sounds routed to the parametric EQ (FX1 on the Output page).

- EQ- -REVB** Range: 00 to 99
Controls the amount of EQ being sent into the plate reverb. A setting of 99 would yield a serial connection between the parametric EQ and the reverb for voices assigned to FX1 (on the Output page). A setting of 00 would eliminate any audible reverb for voices assigned to FX1.
- FX2- -REVB** Range: 00 to 99
Controls the Dry/Wet mix for sounds routed to the plate reverb (FX2 on the Output page).
- FX2 DRY** Range: 00 to 99
Controls the volume of a dry path around the plate reverb.
- EQ INPUT** Range: 00 to 99
Lets you to adjust the input level before the EQs to eliminate the possibility of clipping boosted signals.
- OUTPUT** Range: 00 to 99
Allows you to adjust the output gain to compensate for losses in perceived volume. Setting this gain too high will cause clipping of the output signal.
- MID FC** Range: 00000 to 15000 Hz
This parameter sets the center of the mid-frequency parametric. Higher values have a brighter sound.
- BW** Range: 00000 to 15000 Hz
This parameter is a bandwidth control that determines the width of the resonant peak at the center of the-frequency band. By raising the value, you can produce a narrower bandwidth.
- LEVEL** Range: -99 to +48 dB
This parameter sets the amount of cut (negative values) or boost (positive values) applied to this mid-frequency parametric.
- BASS FC** Range: 00000 to 15000 Hz
Selects the cutoff-frequency of the lower-frequency band shelving filter.
- LEVEL** Range: -99 to +48 dB
Sets the amount of boost or cut applied to the low shelving filter.
- TREBLE FC** Range: 00000 to 15000 Hz
Selects the cutoff-frequency of the upper-frequency band high shelving filter.
- LEVEL** Range: -99 to +48 dB
Sets the amount of boost or cut applied to the high shelving filter.
- REVB DECAY TIME** Range: 0.40 to 140.0 sec.
Controls the amount of time it takes for the reverberation to decay. High values of decay time sound good on drum and percussion tracks.
- PRE-DLY TIME** Range: 0000 to 0300 ms
Controls the amount of time it takes for the input signal to be presented to the plate reverb. A value of 0000 would offer no delay.

HF - DAMPING

Range: 00 to 99

Increasing the value of this parameter will gradually filter out increasing amounts of high-frequency energy. Higher values yield an abrupt decay. Controls the cut off of a low pass filter in series with the decay within the definition.

BANDWIDTH

Range: 01 to 99

Acts as a low-pass filter on the output of the plate reverbs, controlling the amount of high frequencies present. The higher the setting, the more high frequencies are allowed to pass through, offering a brighter ringing sound. Some interesting effects can be created by using a mod controller over a large range.

DETUNE - RATE

Range: 00 to 99

Controls the LFO rate of detuning incorporated within the reverb. Detuning creates a slight pitch shift into the reverberated signal, giving it a more natural sounding decay by breaking up resonant nodes.

DEPTH

Range: 00 to 99

Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.

DEFINITION

Range: 00 to 99

Controls the rate at which echo density increases with time. Higher values can cause the echo density to build at a rate that exceeds the decay rate. Try to select the highest value that works with your sound source for the best performance.

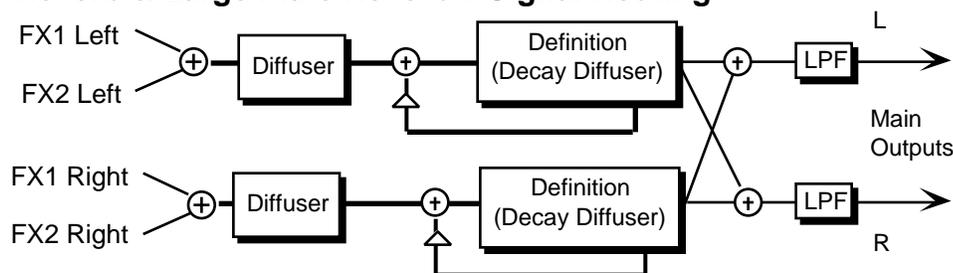
DIFFUSION

Ranges: 00 to 99

The two diffusion parameters smear the input signal to create a smoother sound. Lower values will cause impulse sounds to appear as a series of discrete echoes, while higher values tend to increase the smear, making the echoes less apparent.

24 SMALL PLATE REVERB**25 LARGE PLATE REVERB 1**

A plate reverb takes the vibrations from a metal plate and uses them to create a metallic sounding reverb. **SMALL PLATE REVERB** is a tight sounding plate reverb, and **LARGE PLATE REVERB 1** simulates a larger plate reverb. Small plate reverbs are most often used in the studio for drums and percussion, while large plate reverbs are often used to enhance a vocalist's performance.

Small Plate Reverb & Large Plate Reverb 1 Signal Routing

These two plate reverb algorithms share exactly the same signal routing topology. The internal values of the components (not user programmable) differentiate the large and small plate reverbs. The signal goes directly through the diffusers which smear the signal. The signal is then routed to a larger diffuser, known as Decay Definition, and is diffused over a period of time

(creating a decay). The signal is then routed to the output, and then goes through a low pass filter. There is a parameter that controls the Decay Time of both the left and right signals (shown as triangles above). This signal is then routed back into the definition. There is also an external dry signal (not shown) that goes directly from the input to the Main Output (DRY). The FX-1 and FX-2 MIX parameters can be routed into the effect for different Dry/Wet mixes.

DECAY TIME

Small Plate Range: 0.20 to 100.0 sec
Large Plate 1 Range: 0.40 to 140.0 sec

Controls the amount of time it takes for the reverberation to decay. High values of decay time sound good on these algorithms.

PRE-DLY TIME

Range: 0000 to 0500 msec

Controls the amount of time it takes for the input signal to be presented to the plate reverb. A value of 0000 would offer no delay.

HF - DAMPING

Range: 00 to 99

Increasing the value of this parameter will gradually filter out increasing amounts of high-frequency energy. Higher values yield an abrupt decay. This parameter controls the cut off of a low pass filter in series with the decay within the definition.

BANDWIDTH

Range: 01 to 99

Acts as a low-pass filter on the output of the plate reverbs, controlling the amount of high frequencies present. The higher the setting, the more high frequencies are allowed to pass through, offering a brighter ringing sound. Some interesting effects can be created by using a mod controller over a large range.

L/R BALANCE

Range: -99 to +99

Controls the left/right stereo balance of the plate reverb signal. A setting of -99 would offer hard left, whereas a setting of +99 offers hard right. A setting of +00 would place the reverb in the center of the stereo spectrum.

DEFINITION

Range: 00 to 99

Controls the rate at which echo density increases with time. Higher values can cause the echo density to build at a rate that exceeds the decay rate. For the best results, try to select the highest value that works with your sound source.

DIFFUSION- 1

Range: 00 to 99

Smears the input signal to create a smoother sound. Lower values cause impulse sounds to appear as a series of discrete echoes, while higher values tend to increase the smear, making the echoes less apparent.

DIFFUSION- 2

Range: 00 to 99

This diffuser, similar to and in series with the previous one, offers control over lower-frequency ranges. Plate reverbs tend to sound metallic, and the diffusers help to smear the signal, eliminating the metallic sound.

EARLY REFLECTION LEVELS (1 to 4) Ranges: -99 to +99

Control four early reflection levels. Setting these levels to lower values will produce a wetter sound. These four reflection levels are close to the input of the DEFINITION.

26 LARGE PLATE REVERB 2

This plate reverb shares the same signal routing topology as the previous plate reverbs, but sports poly-phase interpolation, and two additional parameters:

- SPREAD** Range: 00000 to 31129
Determines the time intervals between the seven discrete echoes produced by the plate. The time intervals are adjusted relative to one another.
- SHAPE** Range: -99 to +99
Determines the relative volume of the seven discrete echoes produced by the plate. At +00 seven echoes are all the same volume. At -99 the first echo is quietest, with successive echoes increasing in volume. At +99 produces the opposite effect.

27 HALL REVERB 1

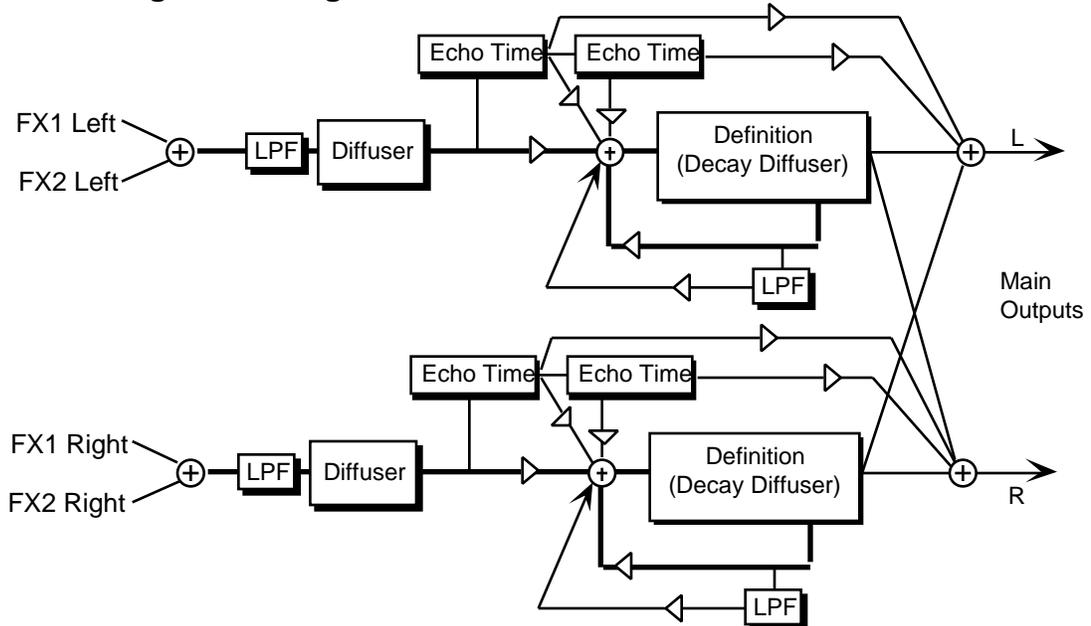
This effect algorithm provides a studio-quality stereo reverb. The FX-1 and FX-2 MIX parameters can be routed into the effect for different Dry/Wet mixes. HALL REVERB is a reverb with a long decay, featuring left to right (transverse) reflections.

- DECAY TIME** Range: 0.20 to 100.0 msec
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.
- PRE-DLY TIME** Range: 0000 to 0500 msec
This parameter creates a time delay before the original signal is fed into the reverb.
- HF - DAMPING** Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.
- BANDWIDTH** Range: 00 to 99
Acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.
- LF DECAY** Range: -99 to +99
This control will boost or cut the rate at which low frequencies will decay.
- DIFFUSION** Range: 00 to 99
Determines whether the early reflections will appear as a series of discrete echoes (lower values) or will be more diffused (higher values).
- DETUNE - RATE** Range: 00 to 99
Controls the LFO rate of detuning incorporated within the reverb. Detuning creates a slight pitch shift into the reverberated signal, giving it a more natural sounding decay by breaking up resonant nodes.
- DEPTH** Range: 00 to 99
Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.

28 HALL REVERB 2

This algorithm can be programmed with a high degree of precision. HALL REVERB 2 is a large acoustic space providing a high density reverb.

HALL REVERB 2 Signal Routing



The signal enters a low pass filter and goes directly through the diffusers which smear the signal. The signal is then routed to a larger decay diffuser, known as Definition, and is diffused over a period of time (creating a decay). There are taps from both the left and right Definition that are routed to the output to create a synthesized stereo output. A signal from the Definition goes through a low pass filter followed by a low-frequency decay parameter, which controls the rate of decay of the low frequencies. There is also a parameter at this stage that controls the decay time of both the left and right signals. The left and right signals are routed back into the Definition. There are two echo times between the diffuser and the definition that can be routed directly to the output, or sent back through the definition. The EFFECT MIX FX-1 and FX-2 parameters allow you to create a Dry/Wet mix.

DECAY TIME

Range: 0.70 to 250. sec

Controls the amount of time it takes for the reverberation to decay to a very low level after the input signal stops. We recommend higher values for the hall reverb.

PRE-DLY TIME

Hall Reverb 2 Range: 0000 to 0500 msec

Controls the amount of time it takes for the original signal to be presented to the reverb. Higher values denote a longer delay.

HF - DAMPING

Range: 00 to 99

Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will gradually filter out (dampen) more and more high-frequency energy.

BANDWIDTH

Range: 01 to 99

The high-frequency bandwidth acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting,

the more high frequencies are allowed to pass. This functions like a tone control on a guitar.

LF DECAY TIME Range: -99 to +99
Acts like a tone control and will boost (when set to a positive value) or cut (when set to a negative value) the rate at which low frequencies will decay.

DEFINITION Range: 00 to 99
Controls the rate at which echo density is increased with time. Setting this parameter too high can cause the echo density to build at a rate which exceeds the decay rate. A general rule of thumb is this: DEFINITION should not exceed the LF DECAY TIME added to the DECAY TIME.

DIFFUSION-1 Range: 00 to 99
Smears the input signal transients to *diffuse* and smooth the sound. Lower values cause impulse sounds to appear as a series of discrete echoes, while higher values tend to increase the smear (smoother sounding with fewer discrete echoes). We recommend settings of 50 for starters.

DIFFUSION-2 Range: 00 to 99
This parameter, similar to and in series with DIFFUSION-1, performs the same way but controls lower-frequency ranges. Experiment with different levels between the diffuser parameters to find the settings that are right for your source.

REFL-1 TIME Range: 0000 to 0120 ms
Controls the delay time for the first pre-echo. Pre-echoes are the first sounds that have been reflected back from the walls or reflective “live” surfaces. Higher values delay the diffused signal more.

LEVEL Range: 00 to 99
Controls the level of the first pre-echo. This pre-level controls the echo send to the DEFINITION.

SEND Range: 00 to 99
Controls the level of the first pre-echo, with the echo routed directly to the output.

REFL-2 TIME Range: 0000 to 0120 ms
Controls the delay time for the second pre-echo.

LEVEL Range: 0 to 99
Controls the level of the second pre-echo. As a signal continues to bounce off the different reflective surfaces (walls), it decreases in volume. Set this parameter to a lower value than REFL-1 LEVEL to create a natural sounding echo.

SEND Range: 00 to 99
Controls the level of the second pre-echo, with the echo routed directly to the output.

DETUNE - RATE Range: 00 to 99
Controls the LFO rate of detuning introduced into the reverberation decay. Detuning creates a slight oscillating pitch shift into the decay, giving it a more natural sound by breaking up resonant nodes.

DEPTH Range: 00 to 99
Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some sounds may require very low values, while others sound more natural with higher values.

PRIMARY SEND Range: -99 to +99
Controls the level of the diffused input signal into the reverb definition.

REVB POSITION BAL- (1 to 3) Ranges: -99 to +99
The Position Balance parameters simulate the depth of the hall. Think of these parameters as three different microphones placed at various distances within the hall (the first is closest to the front, the third is farthest from the front). When the range (volume) is higher for BAL-1, the sound appears closer to the front, whereas a higher setting for BAL-3 appears farther from the front, suggesting a deeper (wetter) hall.

29 HALL REVERB 3

HALL REVERB 3 shares the same signal routing topology as HALL REVERB 2, with a few additional parameters:

DECAY DIFFUSION Range: 00 to 99
Smears the reverb decay signal.

INPUT DIFFUS Ranges: 00 to 99
These parameters smear the input signal transients to *diffuse* and smooth the sound. Lower values cause impulse sounds to appear as a series of discrete echoes, while higher values tend to increase the smear (smoother sounding with fewer discrete echoes). We recommend settings of 50 for starters. Experiment with different levels between the diffuser parameters to find the settings that are right for your source.

SPREAD Range: 00000 to 31129
Determines the time intervals between the seven discrete echoes produced by the hall. The time intervals are adjusted relative to one another.

SHAPE Range: -99 to +99
Determines the relative volume of the seven discrete echoes produced by the hall. At +00 seven echoes are all the same volume. At -99 the first echo is quietest, with successive echoes increasing in volume. At +99 produces the opposite effect.

FRONT-TO-BACK LEVS (1 to 3) Ranges: -99 to +99
These three fields simulate the depth of the hall. Think of these fields as three different microphones placed at various distances within the hall (the first is closest to the front, the third is farthest from the front). When the range (volume) is higher for the first value, the sound appears closer to the front, whereas a higher setting for the last value appears farther from the front, suggesting a deeper (wetter) hall.

L/R BALANCE Range: -99 to +99
Controls the left/right stereo balance of the hall reverb signal. A setting of -99 would offer hard left, whereas a setting of +99 would offer hard right. A setting of +00 would place the reverb in the center of the stereo spectrum.

PRIMARY SEND Range: -99 to +99
Controls the level of the diffused input signal into the reverb definition.

30 SMALL ROOM REVERB

SMALL ROOM REVERB features a short, room-like decay. The FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

DECAY TIME Range: 0.20 to 100.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.

PRE-DLY TIME Range: 0000 to 0500
Creates a delay in the amount of time it takes before the original signal is fed into the reverb. The range is based in milliseconds.

HF - DAMPING Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.

BANDWIDTH Range: 00 to 99
The high-frequency bandwidth parameter acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.

LF DECAY Range: -99 to +99
This control will boost or cut the rate at which low frequencies decay.

DIFFUSION Range: 00 to 99
Determines whether the early reflections will appear as a series of discrete echoes (lower values) or will be more diffused (higher values).

DETUNE - RATE Range: 00 to 99
Controls the LFO rate of detuning incorporated within the reverb. Detuning creates a slight pitch shift into the reverberated signal, giving it a more natural sounding decay by breaking up resonant nodes.

DEPTH Range: 00 to 99
Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.

31 MEDIUM ROOM REVERB

32 LARGE ROOM REVERB

MEDIUM ROOM REVERB provides a highly programmable medium room reverb, and LARGE ROOM REVERB offers a larger room with bright reflective surfaces.

These algorithms share the same signal routing topology as HALL REVERB 2. However, the internal values of the components (not user-programmable) differentiate these reverbs. The EFFECT MIX FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

- DECAY TIME** Medium Room Range: 0.20 to 1.33
Large Room Range: 0.20 to 1.83
Controls the amount of time it takes for the reverberation to decay to a very low level after the input signal stops. In room reverbs we don't recommend higher settings, which tend to create an infinite and unnatural sustain. Since most ambient room reverbs don't naturally have a large decay, set this low for the best sound.
- PRE-DLY TIME** Range: 0000 to 0750 msec
Controls the amount of time it takes for the original signal to be presented to the reverb. Higher values denote a longer delay.
- HF - DAMPING** Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will gradually filter out (dampen) more and more high-frequency energy.
- BANDWIDTH** Range: 00 to 99
The high-frequency bandwidth acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass. This functions like a tone control on a guitar.
- LF DECAY TIME** Range: -99 to +99
Functions as a tone control and boosts (when set to a positive value) or cuts (when set to a negative value) the rate at which low frequencies will decay.
- DEFINITION** Range: 00 to 99
Controls the rate at which echo density is increased with time. Setting this parameter too high can cause the echo density to build at a rate which exceeds the decay rate. A general rule of thumb is this: DEFINITION should not exceed the LF DECAY TIME added to the DECAY TIME.
- INPUT DIFFUSION-1** Ranges: 00 to 99
These four values, in series with each other, smear the input signal transients, to *diffuse* and smooth the sound. Lower values will cause impulse sounds to appear as a series of discrete echoes, while higher values tend to increase the smear (smoother sounding with fewer discrete echoes). Experiment with different levels between the diffuser parameters to find the settings that are right for your source. We recommend settings of 50 for starters.
- REFL-1 TIME** Range: 0000 to 0150 msec
Controls the delay time for the first pre-echo. Pre-echoes are the first sounds that have been reflected back from the walls or reflective "live" surfaces. Higher values delay the diffused signal more.
- REFL-1 LEVEL** Range: 00 to 99
Controls the level of the first pre-echo. This pre-level controls the echo send to the Definition.
- REFL-1 SEND** Range: 00 to 99
Controls the level of the first pre-echo, with the echo routed directly to the output.
- REFL-2 TIME** Range: 0000 to 0150 msec
Controls the delay time for the second pre-echo.
- REFL-2 LEVEL** Range: 00 to 99
Controls the level of the second pre-echo. As a signal continues to bounce off the different reflective surfaces (walls), it decreases in volume. Set this parameter to a lower value than REFL-

1 LEVEL to create a natural sounding echo.

REF-2 SEND Range: 00 to 99
Controls the level of the second pre-echo, with the echo routed directly to the output.

DETUNE - RATE Range: 00 to 99
Controls the LFO rate of detuning introduced into the reverberation decay. Detuning creates a slight oscillating pitch shift into the decay, giving it a more natural sound by breaking up resonant nodes.

DEPTH Range: 00 to 99
Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some sounds may require very low values, while others sound more natural with higher values.

L/R BALANCE Range: -99 to +99
Controls the left/right stereo balance of the gated reverb signal. A setting of -99 would offer hard left, whereas a setting of +99 would offer hard right. A setting of +00 would place the reverb in the center of the stereo spectrum.

PRIMARY SEND Range: -99 to +99
Controls the level of the diffused input signal into the reverb definition.

33 TIGHT AMBIENCE

34 WIDE AMBIENCE

TIGHT AMBIENCE provides room ambience. WIDE AMBIENCE provides a larger ambient room reverb. These two algorithms offer studio quality ambient reverbs that can be controlled with a high degree of precision. The FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

These algorithms share essentially the same signal routing topology as HALL REVERB 2. However, the internal values of the components (not user-programmable) differentiate these three reverbs.

DECAY TIME Tight Ambience Range: 0.20 to 100.0 sec
Wide Ambience Range: 0.20 to 150.0 sec
Controls the amount of time it takes for the reverberation to decay to a very low level after the input signal stops. In these reverbs we don't recommend higher settings, which tend to create an infinite and unnatural sustain. Since most ambient reverbs don't naturally have a large decay, set this low for the best sound.

PRE-DLY TIME Range: 0000 to 0500 msec
Controls the amount of time it takes for the original signal to be presented to the reverb. Higher values denote a longer delay.

HF - DAMPING Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will gradually filter out (dampen) more and more high-frequency energy.

- BANDWIDTH** Range: 00 to 99
The high-frequency bandwidth acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass. This functions like a tone control on a guitar.
- LF DECAY TIME** Range: -99 to +99
Functions as a tone control and boosts (when set to a positive value) or cuts (when set to a negative value) the rate at which low frequencies will decay.
- DEFINITION** Range: 00 to 99
Controls the rate at which echo density is increased with time. Setting this parameter too high can cause the echo density to build at a rate which exceeds the decay rate. A general rule of thumb is this: DEFINITION should not exceed the LF DECAY TIME added to the DECAY TIME.
- DIFFUSION-1** Range: 00 to 99
Smears the input signal transients, to *diffuse* and smooth the sound. Lower values will cause impulse sounds to appear as a series of discrete echoes, while higher values tend to increase the smear (smoother sounding with fewer discrete echoes). We recommend settings of 50 for starters.
- DIFFUSION-2** Range: 00 to 99
This parameter, similar to and in series with DIFFUSION-1, performs the same way but controls lower-frequency ranges. Experiment with different levels between the diffuser parameters to find the settings that are right for your source.
- REFL-1 TIME** Range: 0000 to 0120 msec
Controls the delay time for the first pre-echo. Pre-echoes are the first sounds that have been reflected back from the walls or reflective “live” surfaces. Higher values delay the diffused signal more.
- REFL-1 LEVEL** Range: 00 to 99
Controls the level of the first pre-echo. This pre-level controls the echo send to the Definition.
- REFL-1 SEND** Range: 00 to 99
Controls the level of the first pre-echo, with the echo routed directly to the output.
- REFL-2 TIME** Range: 0000 to 0120 msec
Controls the delay time for the second pre-echo.
- REFL-2 LEVEL** Range: 00 to 99
Controls the level of the second pre-echo. As a signal continues to bounce off the different reflective surfaces (walls), it decreases in volume. Set this parameter to a lower value than REFL-1 LEVEL to create a natural sounding echo.
- REF-2 SEND** Range: 00 to 99
Controls the level of the second pre-echo, with the echo routed directly to the output.
- DETUNE - RATE** Range: 00 to 99
Controls the LFO rate of detuning introduced into the reverberation decay. Detuning creates a slight oscillating pitch shift into the decay, giving it a more natural sound by breaking up resonant nodes.

DEPTH

Range: 00 to 99

Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some sounds may require very low values, while others sound more natural with higher values.

PRIMARY SEND

Range: -99 to +99

Controls the level of the diffused input signal into the reverb definition.

POSITION BAL - (1 to 3)

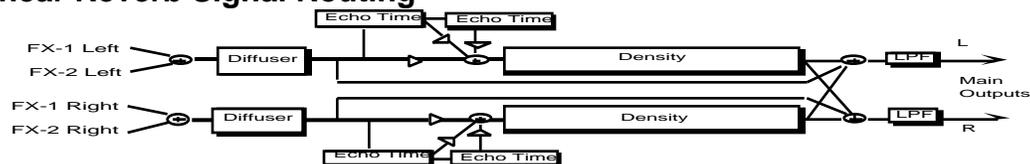
Ranges: -99 to +99

The Position Balance parameters simulate the depth of the room. Think of these parameters as three different microphones placed at various distances within the room (the first is closest to the front, the third is farthest from the front). When the range (volume) is higher for BAL-1, the sound appears closer to the front, whereas a higher setting for BAL-3 appears farther from the front, suggesting a deeper (wetter) room.

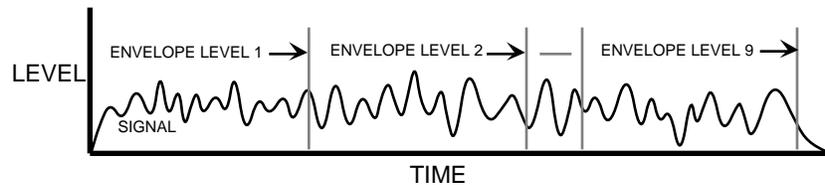
35 NONLINEAR REVERB 1**36 NONLINEAR REVERB 2****37 NONLINEAR REVERB 3**

Non Linear Reverbs can be used to obtain blooming reverb, gated reverb, reverse reverb and early reflections. In general, they do not produce an exponentially decaying reverb. Unlike the hall, room, and plate reverbs, NONLINEAR REVERB 1, 2, and 3 pass the input signal through the reverb diffusers only once. For this reason the reverb diffusers are called *Density*, to distinguish them from the other reverb diffusers (called *Definition*). *Density* controls the *amount* of echo density, as opposed to the rate of increase of echo density. Other reverbs give limited control of early reflections. The Non Linear reverbs deliberately impose a coloration on the resulting sound.

- NONLINEAR REVERB 1 is optimized for shorter duration effects (approx. 0.5 sec.)
- NONLINEAR REVERB 2 offers approx. a 1.5 sec. duration
- NONLINEAR REVERB 3 is sonically similar to NONLINEAR REVERB 1, but there is less stereo movement, making it better suited for drum tracks

Non Linear Reverb Signal Routing

The signal goes directly through a diffuser which smears the signal. The signal is then routed to a decay diffuser (*Density*), and is diffused over a period of time. Within the density the signal goes through a high-frequency damper. The signal is then routed to the output. After the density, the signal passes through a low pass filter. There are two echo times between the diffuser and the density. There is also an external dry signal (not shown) that goes directly from the input to the Main Output (DRY). The FX-1 and FX-2 MIX parameters can be routed into the effect with different Dry/Wet mixes.

**ENVELOPE LEVELS (1 to 9)**

Range: 00 to 99

Control the output tap levels sequenced in time across the density from input to output. Envelope Level 1 is tapped right after the diffusers and before the echoes (see the diagram). If this is undesirable, set Envelope Level 1 to 0. Envelope Levels 8 and 9 are positioned at the very end of the Density; setting these too high can cause excessive ringing. Envelope Levels 8 and 9 are also very dry. Set all nine tap levels to find the envelope for your application. We recommend the average Envelope Level not to exceed a value of 45 to prevent overdriving these reverbs.

DENSITY-1

Range: 00 to 99

Controls the number of echoes.

DENSITY-2

Range: 00 to 99

DENSITY-2 controls the number of echoes in a lower-frequency range. In general, to get the smoothest sound, DENSITY-2 is usually less than the value of DENSITY-1.

DIFFUSION-1

Range: 00 to 99

Smears the input signal transients of higher-frequency ranges. Higher values are recommended for smoother percussion. Very low values will give a highly repetitive echo-like sound. DIFFUSION-1 and 2 exist within each diffuser block (see signal routing diagram).

DIFFUSION-2

Range: 00 to 99

DIFFUSION-2 is similar to DIFFUSION-1, but offers control of lower frequencies. In general a setting of 50 can be considered an equal mix of dry/diffused sound. This setting is a good starting point.

PRIMARY SEND

Range: -99 to +99

Controls the level of the diffused input signal which is nearly instantaneous with respect to the input. This signal is injected directly into the Density at the specified level.

L/R BALANCE

Range: -99 to +99

Controls the left/right stereo balance of the gated reverb signal. A setting of -99 would offer hard left, whereas a setting of +99 would offer hard right. A setting of +0 would place the reverb in the center of the stereo spectrum.

HF - DAMPING

Range: 00 to 99

HF DAMPING is located within the density. This parameter selects the amount of high-frequency energy to be filtered out.

BANDWIDTH

Range: 00 to 99

The high-frequency bandwidth parameter acts as a low-pass filter on the output signal, controlling the amount of high frequencies that will be heard. The higher the setting the more high frequencies are heard. This works the same way that a tone control would work on a guitar.

REFL-1 TIME

Non Lin 1, 3 Range: 0000 to 0600 msec

Non Lin 2 Range: 0000 to 0085 msec

Controls the amount of time it takes for the first pre-echo to be injected into the Density. Pre-echoes are the sounds that have been reflected back from the walls or other reflective surfaces.

REFL-1 SEND Range: -99 to +99
 Controls the level of the first pre-echo.

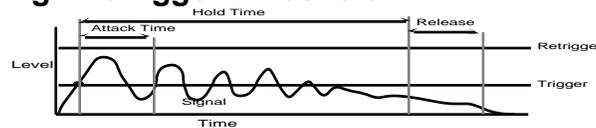
REFL-2 TIME Non Lin 1, 3 Range: 0000 to 0600 msec
 Non Lin 2 Range: 0000 to 0085 msec
 Controls the amount of time it takes for the second pre-echo to be injected into the Density.

REFL-2 SEND Range: -99 to +99
 Controls the level of the second pre-echo. Experiment with both positive and negative on all echoes to change the tonal character of the results.

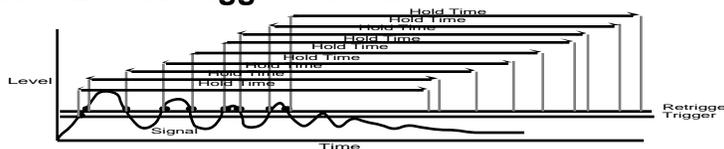
38 GATED REVERB

GATED REVERB provides an excellent gated reverb. When a reverb is muted part way through, it creates a gated sound. To achieve this gated effect, both the Gated and Reverse reverbs must gate a number of internal parameters, not just the output amplitude envelope. It is however, the output amplitude over which the user has control. The TS-12 offers a highly controllable gated reverb, optimized for percussive instruments, but useful for any signal. The gate is first opened when the input signal passes the trigger threshold. This trigger threshold is set as low as possible by the user, so that none of the input signal is missed. The gated reverb is distinguished from the reverse reverb by retriggering whenever the input signal passes a retrigger (user programmable) threshold (see diagrams). The gate will stay open as long as the input signal remains above the retrigger threshold, and all the input signals will be accumulated under this gate until the total input signal level falls below the retrigger threshold. When this happens, the Hold time will begin (as shown in the diagram below). The reason for two thresholds is to eliminate false retriggering and to ensure precise hold-time durations. If you desire a separate gate on each note, use the Non Lin reverbs. The topology for the Gated Reverb is derived from the Plate Reverb. The FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

Gated Reverb with a High Retrigger Threshold



Gated Reverb with a Low Retrigger Threshold



HF DAMPING Range: 00 to 99
 This parameter sounds best when set to low values. Its function is to filter out more and more high-frequency energy. For the most natural sounding reverse effect, we recommend a setting of 00.

DEFINITION Range: 00 to 99
 DEFINITION controls the rate at which echo density is increased with time. If set too high, the echo density will build at a rate that exceeds the decay rate. This can be used for a special effect.

DIFFUSION-1 Range: 00 to 99
 DIFFUSION-1 smears the input signal making a smoother sounding reverb. Controls the high-frequency ranges. For percussion sounds, high values are recommended.

- DIFFUSION-2** Range: 00 to 99
Similar to and in series with DIFFUSION-1, this parameter controls lower-frequency ranges.
- ATTACK** Range: 1msec to 10.0 sec
Sets the ATTACK of the gated reverb once the incoming signal has reached the trigger level. Generally the attack should be short and not set longer than the HOLD. This parameter should not be used to achieve a reverse reverb envelope, because here the attack volume increases whereas in the Reverse Reverb the attack volume accelerates.
- DECAY** Range: 0.20 sec to 100.0 sec
Controls the amount of time it takes for the reverberation to decay.
- HOLD** Range: 1 msec to 10.0 sec
Sets the amount of time that the reverb will hold after the retrigger and before the release. The HOLD will begin again if retriggered.
- RELEASE** Range: 1 msec to 10.0 sec
Sets the amount of time after the HOLD has elapsed for the gated reverb to shut down. Generally these times are very short.
- SLAPBACK - TIME** Range: 0000 to 0500 msec
Controls the delay time of an internal dry stereo signal to create a slapback. In general, the SLAPBACK - TIME is greater or equal to the HOLD time to achieve a reverse effect.
- LEVEL** Range: 00 to 99
Adjusts the volume of the slapback (internal dry) signal. A value of 00 would eliminate any audible slapback.
- RETRIG THRESH** Range: -96 to +00 dB
This parameter sets the level at which the gated reverb will retrigger. For a precise HOLD time that begins at the onset of the incoming source, this parameter should be set higher than the incoming signal to prevent retriggering. After the incoming signal reaches the trigger threshold, the gated reverb is activated. Every time the signal reaches the retrigger threshold, the gated reverb will retrigger causing the HOLD time to restart.
- If the level of this parameter is set lower than the incoming signal, the gated reverb will continue to retrigger. With a high DECAY level, this adds a cavernous quality to percussion instruments.
- TRIG THRESH** Range: -96 to +00 dB
Sets the signal level that triggers the gated reverb. When the incoming signal reaches this value, it triggers (starts) the gated reverb. Higher values would require a stronger incoming signal. Set this parameter as low as possible to work with your particular source, but not too low to cause false triggering.
- EARLY REFLECTION LEVELS (1 to 4)** Ranges: -99 to +99
These parameters control four early reflection levels. Setting these levels to lower values will produce a wetter sound.
- L/R BALANCE** Range: -99 to +99
Controls the left/right stereo balance of the gated reverb signal. A setting of -99 would offer hard left, whereas a setting of +99 would offer hard right. A setting of +00 would place the reverb in the center of the stereo spectrum.

39 REVERSE REVERB 1

REVERSE REVERB 1 produces a reverberation that gradually increases, simulating a backwards sound with a maximum duration of several seconds. When a signal enters this algorithm, the plate reverb (from which this algorithm is derived) is almost instantaneously turned on, and then the output volume is ramped up. This algorithm will only trigger one time. REVERSE REVERB 1 is triggered by an input signal level (THRESHOLD) determined by the user. Once triggered, the reverse envelope will proceed to completion, and ignore subsequent trigger levels. If you are looking for a reverse effect that will retrigger, try using REVERSE REVERB 2. The topology of the Reverse Reverb is similar to the Plate Reverb. The FX-1 and FX-2 MIX parameters offer different dry/wet mixes.

HF DAMPING

Range: 00 to 99

This parameter sounds best when it's set to low values. It has the same function as in the Plate Reverb, which is to filter out more and more high-frequency energy. For the most natural sounding reverse effect, we recommend a setting of 00.

DEFINITION

Range: 00 to 99

DEFINITION controls the rate at which echo density is increased with time. If set too high, the echo density will build at a rate that exceeds the decay rate. This can be used for a special effect.

DIFFUSION-1

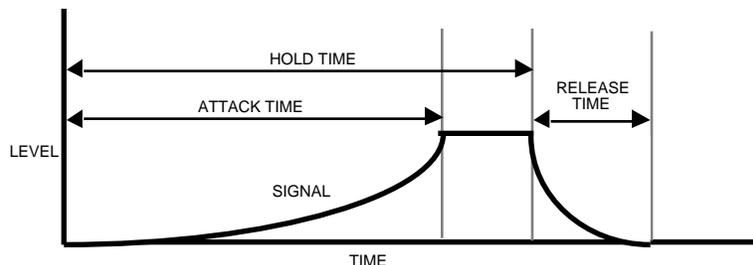
Range: 00 to 99

DIFFUSION-1 smears the input signal making a smoother sounding reverb. Controls the high-frequency ranges. For percussion sounds, high values are recommended.

DIFFUSION-2

Range: 00 to 99

Similar to and in series with DIFFUSION-1, this parameter controls lower-frequency ranges.



ATTACK

Range: 1 msec to 10.0 sec

Sets the duration over which the reverb builds. It is recommended that you set this value less than the HOLD time.

HOLD

Range: 1 msec to 10.0 sec

Controls the amount of time that the reverse envelope will sound after it has been triggered. Rule of thumb: don't set the HOLD time much longer than the ATTACK time.

RELEASE

Range: 1 msec to 10.0 sec

Determines the release time after the HOLD time has elapsed. Generally this time is very short. Lower values offer an abrupt cutoff.

SLAPBACK - TIME

Range: 0000 to 0500 msec

Controls the delay time of an internal dry signal to create a slapback. This effect helps to simulate a backwards reverb, since now the dry signal appears at the end. In general, we recommend the FX Mixes be set all wet (99) for this effect. Rule of thumb: set this parameter at about the same value as the HOLD time.

LEVEL Range: 00 to 99
Adjusts the volume of the slapback (internal dry) signal. A value of 00 would eliminate audible slapback.

TRIG THRESH Range: -96 to +00 dB
Set this parameter as low as possible to work with your particular sound source. To eliminate false triggering, it should not be set too low. When the input signal rises above this threshold, the reverse envelope will begin.

40 REVERSE REVERB 2

REVERSE REVERB 2 is identical to REVERSE REVERB, except this algorithm will retrigger by an assigned input signal level (threshold) determined by the user. Once triggered, the reverse envelope will proceed to completion, unless retriggered by subsequent input signals. If you are looking for a reverse effect that will not retrigger, try using the previous reverse reverb algorithm. The FX-1 and FX-2 MIX parameters are used to select different Dry/Wet mixes.

HF DAMPING Range: 00 to 99
This parameter sounds best when set to low values. Its function is to filter out more and more high-frequency energy. For the most natural sounding reverse effect, we recommend a setting of 00.

DEFINITION Range: 00 to 99
DEFINITION controls the rate at which echo density is increased with time. If set too high, the echo density will build at a rate that exceeds the decay rate. This can be used for a special effect.

DIFFUSION-1 Range: 00 to 99
DIFFUSION-1 smears the input signal making a smoother sounding reverb. Controls the high-frequency ranges. For percussion sounds, high values are recommended.

DIFFUSION-2 Range: 00 to 99
Similar to and in series with DIFFUSION-1, this parameter controls lower-frequency ranges.

ATTACK Range: 1 msec to 10.0 sec
This parameter sets the duration over which the reverb builds. It is recommended that you set this value less than the HOLD time.

HOLD Range: 1 msec to 10.0 sec
Controls the amount of time that the reverse will sound after it has been triggered. Rule of thumb: don't set the HOLD time much longer than the ATTACK time.

- RELEASE** Range: 1 msec to 10.0 sec
Determines the RELEASE time after the HOLD time has elapsed. Generally this time is very short. Lower values offer an abrupt cutoff.
- PRE-TRIG TIME** Range: 0000 to 0530 msec
Used to capture transients that occur before the trigger. This parameter is critical to the sound quality. You can determine how much pretrigger sound will be injected into the reverse reverb tank.
- TRIG THRESH** Range: -96 to +00 dB
Set this parameter as low as possible to work with your particular sound source. To eliminate false triggering, it should not be set too low. When the input signal rises above this threshold, the reverse envelope will begin.

41 STEREO DELAY + DELAY

Two independent professional quality stereo digital delays. Both FX-1 and FX-2 can have different Mix, Feedback, and Delay Time settings.

- EFFECT MIX FX-1 (and 2) DDL** Ranges: 00 to 99
Controls the mix between the original signal and each delay. Setting these parameters to 00 will allow only the unprocessed signal to be heard, while a setting of 99 will eliminate it completely, with only the delay portion remaining.
- D-1 (and 2) REGEN** Range: 00 to 99
Determines the amount of signal that will be fed from the output of each delay back into the input, increasing the number of repeats in the delay.
- D-1 (and 2) TIME (L and R)** D-1 (L and R) Ranges: 0000 to 2000
D-2 (L and R) Ranges: 0000 to 0150
Determines the amount of time between delays. Each value increases the delay time by 1 millisecond. The Left and Right channels are independently adjustable.

42 MULTITAP DELAY

MULTITAP DELAY produces four independent controllable delays. The EFFECT MIX FX-1 and FX-2 parameters can be routed into the effect with different dry/wet mixes. This algorithm sounds best with a mix of wet and dry.

- DELAY-1 TIME** Range: 0000 to 2201 msec
Sets the amount of delay time for the independent delays. Experiment with different settings to find the right mix for your sound source and application. Some interesting effects can be implemented by using a real-time modulation controller for these parameters.
- LEVEL** Range: 00 to 99
Adjusts the volume of the delayed signals against the original dry signal. A level of 00 will offer no audible delay.
- REGEN** Range: 00 to 99
Determines the amount of signal that will be fed from the output back into the input, increasing the number of repeats in the delays. A setting of 99 would offer an infinite delay.

PAN

Range: -99 to +99

Determines the location of the delays in the stereo spectrum. A value of -99 is panned far left, and +99 is far right.

DELAY-2 TIME**DELAY-3 TIME****DELAY-4 TIME****LEVEL****LEVEL****LEVEL****REGEN****REGEN****REGEN****PAN****PAN****PAN**

Each of the four discrete delays has identical parameters and ranges as described above.

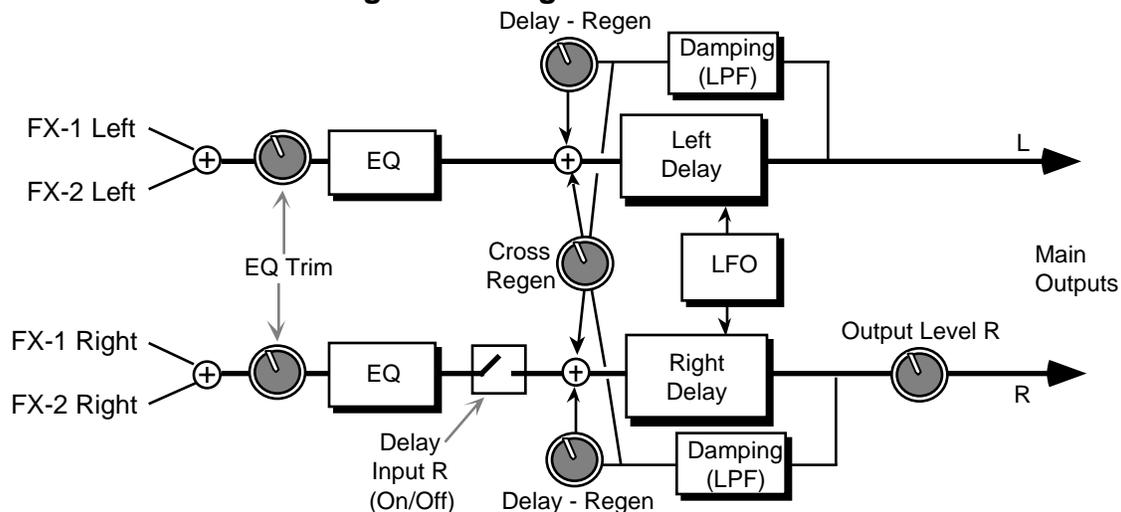
REGEN DAMPING

Range: 00 to 99

Controls the cutoff of a low pass filter on the feedback signal, which adjusts the amount of damping to the feedback signals. The higher the number, the more the signals are damped.

43 EQ- -STEREO DELAYLFO

EQ- -STEREO DELAYLFO features a parametric EQ and a stereo digital delay that provides LFO modulation of a wide range of delays. This algorithm sounds great with an electric piano, but try it with any source!

EQ- -STEREO DELAYLFO Signal Routing

The EFFECT MIX FX-1 and FX-2 DELAYLFO parameters can be routed into the effect with different Dry/Wet mixes.

LFO RATE

Range: 00 to 99

Controls the rate of pitch modulation which is the LFO. To achieve a chorusing effect, this rate must be very slow.

WIDTH

Range: 00 to 99

Controls the excursion of pitch modulation. Since the rate is usually very slow, the width is usually large.

L/R LFO

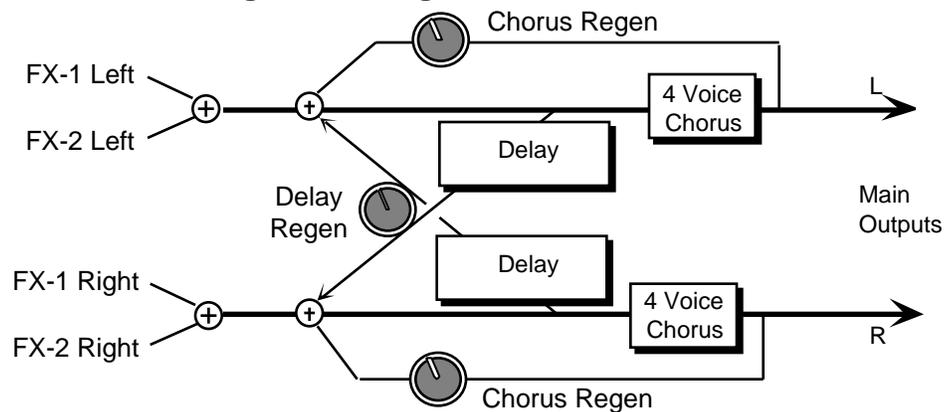
Range: OUT-OF-PHASE or IN-PHASE

When this parameter is IN-PHASE, the left and right choruses will modulate their detunes together. When set to OUT-OF-PHASE, the detune on the left channel will go up while the detune on the right will go down.

- DELAY INPUT R** Range: OFF or ON
Disables the input into the right side delay line. The right delay line will still get input from the CROSS REGEN. This allows a ping-pong delay effect.
- OUTPUT LEVEL R** Range: 00 to 99
Controls the right output signal level.
- DELAY - REGEN** Range: -99 to +99
Controls the amount of regen (regeneration) applied to the delay time taps. The sign of the value determines the polarity of the regen.
- TIME L** Range: 0000 to 0845 msec
Determines the amount of time between the input signal and the left delay output.
- TIME R** Range: 0000 to 0845 msec
Determines the amount of time between the input signal and the right delay output. Set this differently from the left delay time to achieve dotted 1/8th note type effects.
- CROSS REGEN** Range: -99 to +99
Allows you to feedback the delayed signals to their opposite sides; the left voice crosses to the right voice, and the right voice crosses to the left voice. A setting of +99 or -99 will cause infinite delay. Be careful, if the delay regen is set too high, it may cause this parameter to “blow up.”
- REGEN DAMPING** Range: 00 to 99
Adjusts the cutoff of a low pass filter on the feedback signal, which controls the amount of damping to the feedback signals. The higher the number, the more the signals are damped.
- EQ TRIM** Range: -24 to +00 dB
Allows you to adjust the input volume of the EQs to eliminate the possibility of clipping boosted signals.
- BASS FC** Range: 0000 to 1000 Hz
Sets the cutoff-frequency of the lower-frequency band shelving filter.
- LEVEL** Range: -48 to +24 dB
Sets the amount of boost or cut applied to the low shelving filter.
- TREBLE FC** Range: 01KHz to 15KHz
Sets the cutoff-frequency of the high shelving filter.
- LEVEL** Range: -48 to +24 dB
Sets the amount of boost or cut applied to the high shelving filter.

44 EIGHT VOICE CHORUS

EIGHT VOICE CHORUS offers a symphonic chorused sound having eight different voices and using eight separately randomized LFOs. This algorithm also offers a user programmable stereo delay in a cross coupled configuration between the left and right chorused outputs (see diagram). This algorithm is good for creating an ensemble of instruments from single sources (there is no internal filtering applied to any of the chorused voices). The EFFECT MIX FX-1 and FX-2 CHORUS parameters can be routed into the effect with different Dry/Wet mixes. For this algorithm we recommend a mix of around 50 for a starting point.

EIGHT VOICE CHORUS Signal Routing**CHORUS RATE**

Range: 00 to 99

Controls the eight ganged rates of modulation of the respective voices and produces an effect similar to both vibrato and tremolando occurring at the same time.

WIDTH

Range: 00 to 99

Controls the excursion of the vibrato of all the individual voices.

REGEN

Range: 00 to 99

Determines the amount of signal that will be fed from the output of the chorus back into the input of the chorus. A value of 00 will eliminate the regeneration effect.

STEREO SPREAD

Range: 00 to 99

This parameter offers a synthesized stereo field. The highest value is true stereo, intermediate values have the left and right signals mixed on both sides, and the lowest value yields only the left input channel from the right and left outputs. This parameter, though not a stereo pan, provides some interesting stereo effects when controlled by a modulation source.

DELAY REGEN

Range: 00 to 99

Determines the amount of signal that will be fed from the delay output back into the chorus input, increasing the number of repeats in the delay for high values. A value of 00 will eliminate the delay effect.

TIME L

Range: 0000 to 0800 ms

Controls the amount of time that the non-chorused signal will delay for the left channel.

TIME R

Range: 0000 to 0800 ms

Controls the amount of time that the non-chorused signal will delay for the right channel.

45 CHORUS + REVERB 1

This effect combines a four-voice chorus with the standard reverb. Assign a voice to FX-1 to get reverb after chorus, or use FX-2 for reverb only.

CHORUS MIX

Range: 00 to 99

Controls the Dry/Wet mix within the chorus itself.

RATE

Range: 00 to 99

Controls the four rates of modulation of the delay time of the chorus. The delay modulation produces vibrato and tremolo.

- WIDTH** Range: 00 to 99
Controls the depth of vibrato and tremolo.
- REGEN** Range: -99 to +99
Controls the amount of feedback applied to the chorus. The sign of the value determines the polarity of the feedback. Feedback accentuates the complexity of the “swept” signal.
- DECAY TIME** Range: 0.20 to 100.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.
- EARLY REF LEV** Range: 00 to 99
Controls the level of pre-echoes of the input signal added directly to the reverb output.
- HF - DAMPING** Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.
- BANDWIDTH** Range: 00 to 99
Acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.
- LF DECAY** Range: -99 to +99
Boosts or cuts the rate at which low frequencies will decay.
- DIFFUSION** Range: 00 to 99
Determines whether the early reflections will appear as a series of discrete echoes (lower values) or will be more diffused (higher values).
- DETUNE - RATE** Range: 00 to 99
Controls the LFO rate of detuning incorporated within the reverb. Detuning creates a slight pitch shift into the reverberated signal, giving it a more natural sounding decay by breaking up resonant nodes.
- DEPTH** Range: 00 to 99
Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.

46 CHORUS + REVERB 2

This effect combines a four-voice chorus with a plate reverb, sporting superior randomization and poly-phase interpolation. Assign a voice to FX-1 to get reverb after chorus, or use FX-2 for reverb only.

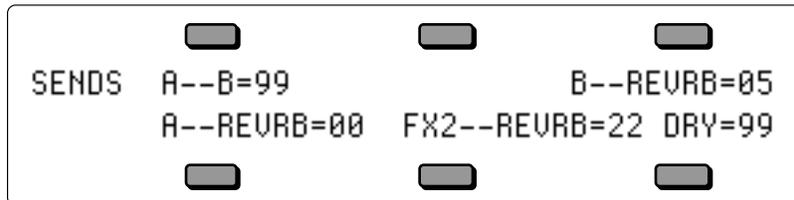
- CHORUS MIX** Range: 00 to 99
Controls the Dry/Wet mix within the chorus itself.
- RATE** Range: 00 to 99
Controls the four rates of modulation of the delay time of the chorus. The delay modulation produces vibrato and tremolo.

- WIDTH** Range: 00 to 99
Controls the depth of vibrato and tremolo.
- STEREO SPREAD** Range: 00 to 99
This parameter offers a synthesized stereo field. The highest value is true stereo, intermediate values have the left and right signals mixed on both sides, and the lowest value yields only the left input channel from the right and left outputs. This parameter, though not a stereo pan, provides some interesting stereo effects when controlled by a modulation source.
- REGEN** Range: -99 to +99
Controls the amount of feedback applied to the chorus. The sign of the value determines the polarity of the feedback. Feedback accentuates the complexity of the “swept” signal.
- REVB DECAY TIME** Range: 0.40 to 140.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.
- PRE-DLY TIME** Range: 0000 to 0300
Creates a delay in the amount of time it takes before the original signal is fed into the reverb. The range is based in milliseconds.
- HF - DAMPING** Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.
- BANDWIDTH** Range: 00 to 99
Acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.
- DETUNE - RATE** Range: 00 to 99
Controls the LFO rate of detuning incorporated within the reverb. Detuning creates a slight pitch shift into the reverberated signal, giving it a more natural sounding decay by breaking up resonant nodes.
- DEPTH** Range: 00 to 99
Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.
- DEFINITION** Range: 00 to 99
Controls the rate at which echo density is increased with time. Setting this parameter too high can cause the echo density to build at a rate which exceeds the decay rate.
- DIFFUSION** Ranges: 00 to 99
These values, in series with each other, smear the input signal transients, to *diffuse* and smooth the sound. Lower values will cause impulse sounds to appear as a series of discrete echoes, while higher values tend to increase the smear (smoother sounding with fewer discrete echoes). Experiment with different levels between the diffuser parameters to find the settings that are right for your source. We recommend settings of 50 for starters.

47 DDL- -CHORUS + REVRB 1

This effect algorithm is a serial version of the DDL+CHORUS+REV parallel effect, combining a digital delay with a chorus and a plate reverb. The second sub-page (not user-programmable) shows how this effect is routed:

- Voices assigned to FX1 are sent to Effect A (DDL)
- The output of Effect A is sent to Effect B (CHORUS)
- Voices assigned to FX2 are sent to a plate reverb (REV)



SENDS A- -B

Range: 00 to 99

Controls the amount of Effect A (DDL) being sent into Effect B (the chorus). A setting of 99 would yield a serial connection between Effect A and the chorus for voices sent to FX1 and panned hard left (on the Output page). A setting of 00 would offer no chorusing.

B- -REVRB

Range: 00 to 99

Controls the amount of Effect B (CHORUS) being sent into the reverb. This would allow you to add reverb to voices assigned to FX1 and panned hard right. A setting of 99 would yield a serial connection between the CHORUS and the reverb for voices sent to FX1 and panned hard right (on the Output page).

A- -REVRB

Range: 00 to 99

Controls the amount of Effect A (DDL) being sent into the reverb. This would allow you to add reverb to voices assigned to FX1, without having to add any chorusing.

FX2- -REVRB

Range: 00 to 99

Defines how much of the voices assigned to FX2 (on the Output page) will be sent into the Reverb. This allows you to fine tune the amount of reverb coloration you want to add to your voices.

DRY

Range: 00 to 99

This parameter allows you to define how much of the FX2 signal you want to completely bypass the Reverb. By setting this parameter to 99 and the FX2- -REVB parameter to 00, you can assign voices to be completely dry.

DDL MIX

Range: 00 to 99

Controls the mix between the original signal and the delay. Setting this parameter to 00 will allow only the unprocessed signal to be heard, while a setting of 99 will eliminate it completely, with only the delay portion remaining.

LEVEL

Range: 00 to 99

Adjusts the volume of the delayed signals against the original dry signal. A level of 00 will offer no audible delay.

PAN

Range: -99 to +99

Determines the location of the delays in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right. If set to either hard left or hard right, the delayed signal for the opposite side is inaudible.

- DDL REGEN L** Range: -99 to +99
Determines the amount of signal that will be fed from the output of the left delay back into the input, increasing the number of repeats in the delay. A setting of 99 would offer an infinite delay.
- DAMPING** Range: 00 to 99
Controls the cutoff of a low pass filter on the feedback signal, which adjusts the amount of damping to the feedback signals. The higher the number, the more the signals are dampened.
- DELAY TIME L and R** Ranges: 0000 to 1000 msec
Sets the amount of delay time for the independent delays. Each value increases the delay time by 1 millisecond. Experiment with different settings to find the right mix for your sound source and application. Some interesting effects can be implemented by using a real-time modulation controller for these parameters.
- CHORUS MIX** Range: 00 to 99
Controls the Dry/Wet mix within the chorus itself. For starters, we recommend settings of 50.
- LEVEL** Range: 00 to 99
Adjusts the volume of the chorused signal. A level of 00 will offer no audible signal.
- WET PAN** Range: -99 to +99
Determines the location of the chorused signal in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.
- DRY PAN** Range: -99 to +99
Determines the location of the dry signal in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.
- CHORUS CENTER** Range: 000 to 127
Controls the nominal delay time of the chorus about which the delay modulation occurs. Adjusting this parameter will change the tonal character of the effect. This delay time is not related to the REGEN or the DDL delays.
- RATE** Range: 000 to 127
Controls the four rates of modulation of the delay time of the chorus. The delay modulation produces vibrato and tremolo.
- WIDTH** Range: 000 to 127
Controls the depth of vibrato and tremolo.
- LFO SPREAD** Range: 000 to 128
Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.
- REGEN** Range: -99 to +99
Controls the amount of feedback applied to the chorus. The sign of the value determines the polarity of the feedback. Feedback accentuates the complexity of the “swept” signal.
- REVERB DECAY TIME** Range: 0.40 to 140.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.

- PRE-DLY TIME** Range: 0000 to 0300 msec
This parameter creates a time delay before the original signal is fed into the reverb. The range is based in milliseconds.
- HF - DAMPING** Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.
- BANDWIDTH** Range: 00 to 99
Acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.
- DEFINITION** Range: 00 to 99
Controls the rate at which echo density increases with time. Higher values can cause the echo density to build at a rate that exceeds the decay rate. For the best performance, try to select the highest value that works with your sound source.
- DIFFUSION** Ranges: 00 to 99
These parameters determine whether the early reflections will appear as a series of discrete echoes (lower values) or will be more diffused (higher values).

48 DDL- -CHORUS + REVRB 2

This effect algorithm, similar to the previous algorithm, offers a different reverb. For a complete description of the SENDS, DDL, and CHORUS parameters, refer to the previous algorithm in this section.

- REVERB DECAY TIME** Range: 0.40 to 140.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.
- PRE-DLY TIME** Range: 0000 to 0150 msec
This parameter creates a time delay before the original signal is fed into the reverb. The range is based in milliseconds.
- HF - DAMPING** Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.
- BANDWIDTH** Range: 00 to 99
Acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.
- FRONT-TO-BACK LEVS (1 to 3)** Ranges: -99 to +99
These three fields simulate the depth of the room/hall. Think of these fields as three different microphones placed at various distances within the room/hall (the first is closest to the front, the third is farthest from the front). When the range (volume) is higher for the first value, the sound appears closer to the front, whereas a higher setting for the last value appears farther from the front, suggesting a deeper (wetter) room/hall.

DEFINITION

Range: 00 to 99

Controls the rate at which echo density increases with time. Higher values can cause the echo density to build at a rate that exceeds the decay rate. For the best performance, try to select the highest value that works with your sound source.

DIFFUSION

Ranges: 00 to 99

These parameters determine whether the early reflections will appear as a series of discrete echoes (lower values) or will be more diffused (higher values).

49 EQ- -CHORUS + REVERB

This algorithm offers a serial version of the PARAM EQ+CHORUS+REV parallel effect. The second sub-page (not user-programmable) shows how this effect is routed:

- Voices assigned to FX1 are sent to Effect A (PARAM EQ)
- The output of Effect A is sent to Effect B (CHORUS)
- Voices assigned to FX2 are sent to the reverb (REV)

For a complete description of the SENDS parameters, refer to the DDL- -CHORUS + REVRB 1 algorithm found earlier in this section.

INPUT

Range: 00 to 99

Allows you to adjust the input level trim to the EQs to eliminate the possibility of clipping boosted signals.

OUTPUT

Range: 00 to 99

Adjusts the output volume after the parametric EQ. With the LEVEL, BASS LEVEL, and TREBLE LEVEL set to high values, the OUTPUT parameter could be used to create a raspy distortion effect.

PAN

Range: -99 to +99

Determines the location of the EQ in the stereo spectrum. A value of -99 is panned hard left, and +99 is hard right.

MID FC

Range: 00000 to 15000

Sets the center of the mid-frequency parametric.

BW

Range: 0 to 15K

This parameter is a bandwidth control that determines the width of the resonant peak at the mid-frequency band. By lowering the value, you can produce a narrower bandwidth.

LEVEL

Range: -99 to +48 dB

Sets the amount of boost or cut applied to this mid-frequency parametric.

BASS LEVEL

Range: -99 to +48 dB

Sets the amount of boost or cut applied to a 0 to 80Hz low-shelving filter.

TREBLE LEVEL

Range: -99 to +48 dB

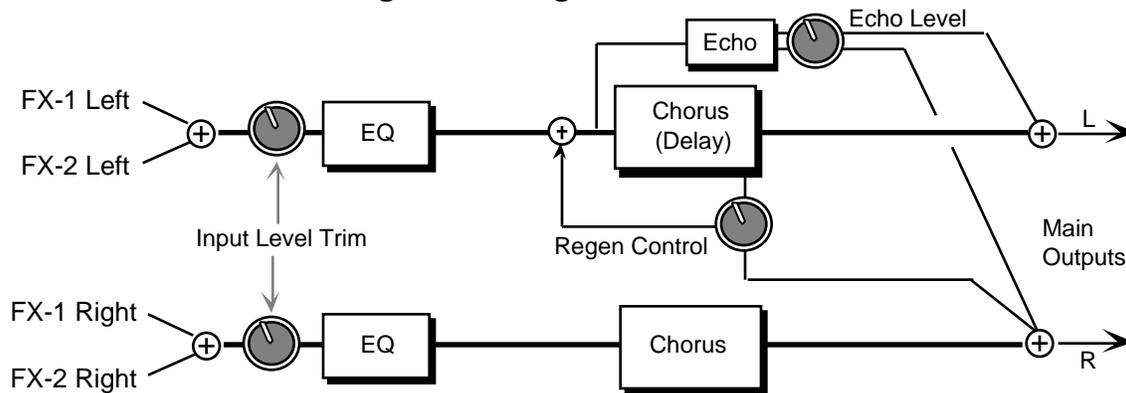
Sets the amount of boost or cut applied to a 10 to 15K high-shelving filter.

For a complete description of the remaining parameters, refer to the DDL+CHORUS+REV algorithm found earlier in this section.

50 EQ- -CHORUS + EQ- -DDL

EQ- -CHORUS + EQ- -DDL combines an EQ and a chorus, with an EQ and a digital delay. This is the industry standard chorus effect, designed with very long delays to provide a modulated detune effect. This algorithm sounds great with a guitar sound, but try it with any source!

EQ- -CHORUS + EQ- -DDL Signal Routing



The signal enters a programmable EQ, which is preceded by an input level trim (EQ TRIM). The signal is then routed to the chorus which is heard directly at the output. There is also a delayed unchorused signal (sharing the same delay lines) that is routed back into the chorus. There is also a second signal from the delay line that is routed to the right side. There are two discrete echo times tapped out before the chorus delay line. These are unchorused echoes. The signal from the echoes is routed directly to the outputs. There is also a dry signal (not shown) that goes directly from the input to the Main Output (DRY). The EFFECT MIX FX-1 and FX-2 CHORUS parameters can be routed into the effect with different Dry/Wet mixes.

CHORUS CENTER Range: 00 to 99

Controls the nominal delay time of the chorus about which the delay modulation occurs. Adjusting this parameter will change the tonal character of the effect. This delay time is not related to the regen delays or the echo delays.

RATE Range: 00 to 99

Controls the rate of pitch modulation which is the chorus. To achieve chorusing, this rate must be very slow.

WIDTH Range: 00 to 99

Controls the excursion of pitch modulation. Since the rate is usually very slow, then the width is usually very large.

L/R LFO Range: OUT-OF-PHASE or IN-PHASE

When this parameter is IN-PHASE, the left and right choruses will modulate their detunes together. When set to OUT-OF-PHASE, the detune on the left channel will go up while the detune on the right will go down.

DELAY - REGEN Range: -99 to +99

Controls the amount of regeneration applied to the delay time taps. The sign of the value determines the polarity of the regen.

TIME (L and R) Ranges: 0000 to 1500 msec

These parameters control the time delay for the left and right channel regen delay, and have nothing to do with the chorus effect.

- ECHO - LEVEL** Range: 00 to 99
Controls the volume of the discrete echo for both the left and right sides. Higher values offer louder echo, while a value of 00 will eliminate the echo. For sustained sounds, mid echo levels yield a “poor man’s reverb.”
- TIME (L and R)** Ranges: 0000 to 1500 msec
These parameters control the chorus echo time. Higher settings yield a deeper echo. There are two discrete echoes, one to the left and one to the right.
- EQ TRIM** Range: -24 to +00 dB
Allows you to adjust the input volume of the EQs to eliminate the possibility of clipping boosted signals.
- BASS FC** Range: 0000 to 1000 Hz
Sets the cutoff-frequency of the lower-frequency band shelving filter.
- LEVEL** Range: -48 to +24 dB
Sets the amount of boost or cut applied to the low shelving filter.
- TREBLE FC** Range: 01KHz to 15KHz
Sets the cutoff-frequency of the high shelving filter.
- LEVEL** Range: -48 to +24 dB
Sets the amount of boost or cut applied to the high shelving filter.

51 FLANGER + REVERB

The FLANGER + REVERB algorithm is similar to the CHORUS + REVERB algorithm with a single LFO. Assign a voice to FX-1 to get reverb after flange, or use FX-2 for reverb only.

- FLANGER CENTER** Range: 00 to 99
Controls the center of the flanger width.
- RATE** Range: 00 to 99
Controls the rate of modulation of the flanger effect.
- WIDTH** Range: 00 to 99
Controls the range of the high to low-frequency sweep in the flanger effect.
- REGEN** Range: -99 to +99
Controls the amount of feedback applied to the flanger. The sign of the value determines the polarity of the feedback.
- DEPTH** Range: 00 to 99
Controls the depth of the notches created by the flanging effect.
- DECAY TIME** Range: 0.20 to 100.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.
- EARLY REF LEV** Range: 00 to 99
Controls the level of pre-echoes of the input signal added directly to the reverb output.

HF - DAMPING

Range: 00 to 99

Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.

BANDWIDTH

Range: 00 to 99

Acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.

LF DECAY

Range: -99 to +99

This control will boost or cut the rate at which low frequencies will decay.

DIFFUSION

Range: 00 to 99

Determines whether the early reflections will appear as a series of discrete echoes (lower values) or will be more diffused (higher values).

DETUNE - RATE

Range: 00 to 99

Controls the LFO rate of detuning incorporated within the reverb. Detuning creates a slight pitch shift into the reverberated signal, giving it a more natural sounding decay by breaking up resonant nodes.

DEPTH

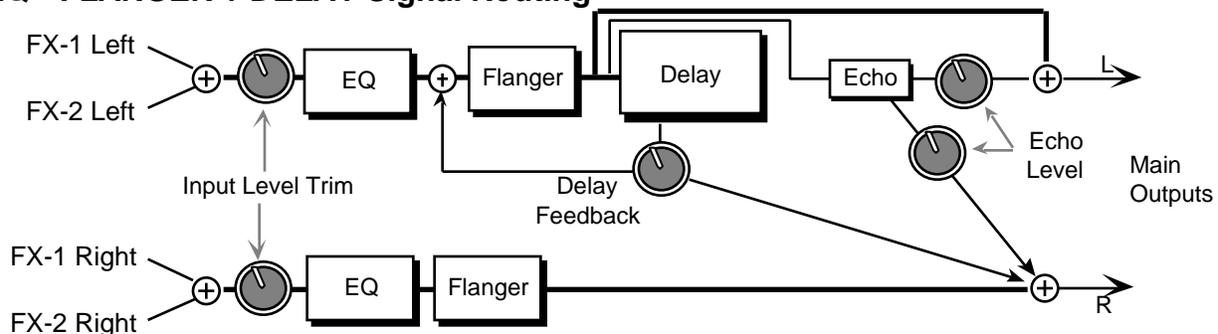
Range: 00 to 99

Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.

52 EQ- -FLANGER + DELAY

EQ- -FLANGER + DELAY combines an EQ and a flanger, and a digital delay. Use flanging to get that “jet aircraft woosh” effect.

EQ- -FLANGER + DELAY Signal Routing



In this algorithm the signal enters an input level trim (EQ TRIM) followed by a programmable EQ, and then is routed to the flanger. The flanger is routed directly to the output. The left channel signal passes through the delay and is routed back into the flanger. Another signal from the delay is routed to the output on the right side. The DELAY - REGEN parameter controls both delay levels. There are two discrete echoes that are sent to the left and right outputs respectively. The signal from both echoes has one level control (ECHO - LEVEL). There is also an external dry signal (not shown) that goes directly from the input to the Main Output (DRY). The EFFECT MIX FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

- FLANGE CENTER** Range: 00 to 99
Controls the sweep center of the flanger effect. The larger the flanger center, the wider will be the available width.
- RATE** Range: 00 to 99
Controls the rate of modulation of the flanger effect.
- WIDTH** Range: 00 to 99
Controls the range of the high to low-frequency sweep in the flanger effect.
- REGEN** Range: -99 to +99
Controls the amount of feedback applied from the output to the flanger input. The sign of the value determines the polarity of the feedback.
- NOTCH DEPTH** Range: -99 to +99
Controls the depth of the notches created by the flanging effect. A setting of +00 will disable the flanging effect. A setting of +00 will also provide a doppler effect for wide moderately slow LFO rates.
- S/H RATE** Range: 000 to 100
Controls the sample rate of a sample and hold network. This is applied to the LFO within the flanger. When in hold, the effect will be to create momentarily fixed notches within the frequency spectrum (if the notch depth is not +00). A setting of 001 will have the largest space between samples. Higher values will increase the number of holds per second, making the flanging flow more smoothly. The sample and hold function can be turned off (when set to 000).
- L/R LFO** Range: OUT-OF-PHASE or IN-PHASE
Determines whether the flanger on the left and right channels is modulating IN-PHASE or OUT-OF-PHASE.
- DELAY - REGEN** Range: -99 to +99
Controls the level of the delay time taps. The sign of the value determines the polarity of the feedback.
- TIME (L and R)** Ranges: 0000 to 1500 msec
These parameters control the time delay for the left and right channel regen delays. The left is the “ping,” and the right is the “pong.”
- ECHO - LEVEL** Range: 00 to 99
Controls the volume of the discrete echoes for both the left and right sides. A setting of 00 would eliminate any audible echo.
- TIME (L and R)** Range: 0000 to 1500 msec
These parameters control the flanger echo times for the left and right sides. Higher values yield a deeper echo.
- EQ TRIM** Range: -24 to +00 dB
Allows you to adjust the input volume of the EQs to eliminate the possibility of clipping boosted signals.
- BASS FC** Range: 0000 to 1000 Hz
Sets the cutoff-frequency of the lower-frequency band shelving filter.

LEVEL Range: -48 to +24 dB
Sets the amount of boost or cut applied to the low shelving filter.

TREBLE FC Range: 01KHz to 15KHz
Selects the cutoff of the upper-frequency band high shelving filter.

LEVEL Range: -48 to +24 dB
Sets the amount of boost or cut applied to the high shelving filter.

53 PHASER + REVERB

A 12-pole phase shifter with reverb. Assign a sound to FX-1 for reverb after phase, to FX-2 for just reverb, or to DRY to bypass the effect.

PHASER CENTER Range: 00 to 99
Controls the center of the phaser width.

RATE Range: 00 to 99
Controls the rate of modulation of the phaser poles.

WIDTH Range: 00 to 99
Controls the amount of modulation applied to phaser poles.

REGEN Range: -99 to +99
Controls the amount of feedback applied to the phaser. The sign of the value determines the polarity of the feedback.

DEPTH Range: 00 to 99
Controls the depth of the notches created by the phasing.

DECAY TIME Range: 0.20 to 100.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.

EARLY REF LEV Range: 00 to 99
Controls the level of pre-echoes of the input signal added directly to the reverb output.

HF - DAMPING Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.

BANDWIDTH Range: 00 to 99
Acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.

LF DECAY Range: -99 to +99
Boosts or cuts the rate at which low frequencies will decay.

DIFFUSION Range: 00 to 99
Determines whether the early reflections will appear as a series of discrete echoes (lower values) or will be more diffused (higher values).

DETUNE - RATE

Range: 00 to 99

Controls the LFO rate of detuning incorporated within the reverb. Detuning creates a slight pitch shift into the reverberated signal, giving it a more natural sounding decay by breaking up resonant nodes.

DEPTH

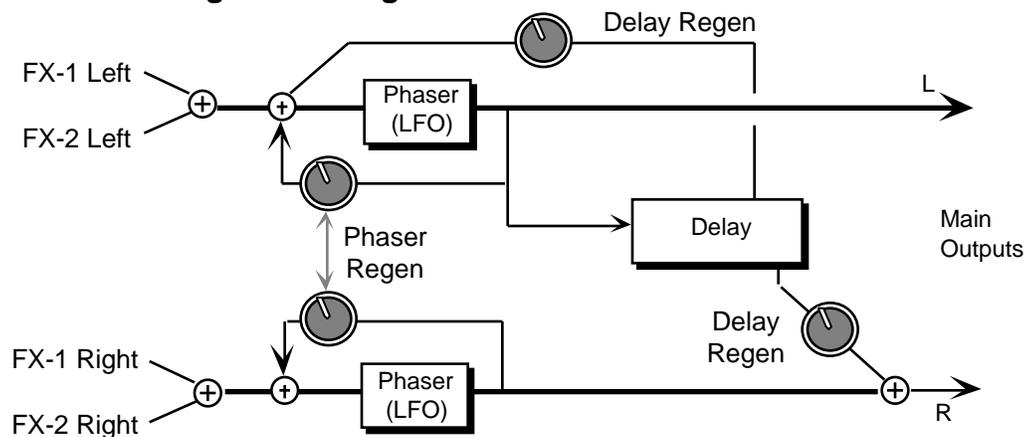
Range: 00 to 99

Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.

54 PHASER + DELAY

PHASER + DELAY combines a phaser with a digital delay. The phaser creates non-harmonically spaced moving notches in the signal spectrum, whereas a flanger creates harmonic spacing. This phaser implements a stereo twelve pole phasing network to achieve time delay which is a function of-frequency; this is what differentiates the phaser from the flanger. The phasing effect is achieved within the phaser topology, so it does not depend upon the external mix. A delay is included at the left output of the phaser that feeds back into the phaser (see the diagram). Setting the phaser REGEN parameter (shown at the knobs) to 00 will disable this delay function. The DELAY REGEN also controls the delay feed forward level of another tap sent to the right channel. This delay topology achieves a 1.5 second ping-pong effect, and is very effective as a “poor man’s reverb.” The FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

PHASER + DELAY Signal Routing

**PHASER CENTER**

Range: -99 to +99

Controls the phaser pole center. High values raise the nominal spectral location of the “woosh” sound, while low values lower the “woosh.” The range from high to low is controlled with the phaser width.

RATE

Range: 00 to 99

The LFO is within the phaser network. This parameter controls the rate of modulation of the phaser poles. The higher the value the faster the rate. Lower values work best with sustained signals.

WIDTH

Range: 00 to 99

Controls the width of the notch excursion. For large excursions set this parameter to 99. Doing so can give a very high “woosh” and a very low “woosh.”

REGEN Range: -99 to +99
Controls the amount of feedback applied to the left and right channel phaser. The sign of the value determines the polarity of the feedback.

NOTCH DEPTH Range: -99 to +99
Controls the depth of the notches created by the phasing. Deep notches occur in the phased spectrum when the parameter is set to 99. When this parameter is set to +00, there exists no phasing (i.e. notches), but there is a doppler effect with higher phase rates.

S/H RATE Range: 000 to 100
Controls the sample rate of a sample and hold network applied to the LFO within the phaser. When in hold, the effect will be to create momentarily fixed notches within the frequency spectrum (if the notch depth is not +00). A setting of 001 will have the largest space between samples. Higher values will increase the number of holds per second, making the phasing flow more smoothly. The sample and hold function can be turned off (when set to 000).

L/R LFO Range: OUT-OF-PHASE or IN-PHASE
Determines whether the phaser on the left and right channels is modulating IN-PHASE or OUT-OF-PHASE.

REGEN Range: -99 to +99
Controls the feedback amount for the delay effect. The sign of the value determines the polarity of the feedback. A value of +00 will eliminate the delay effect. This parameter also controls the feed forward level.

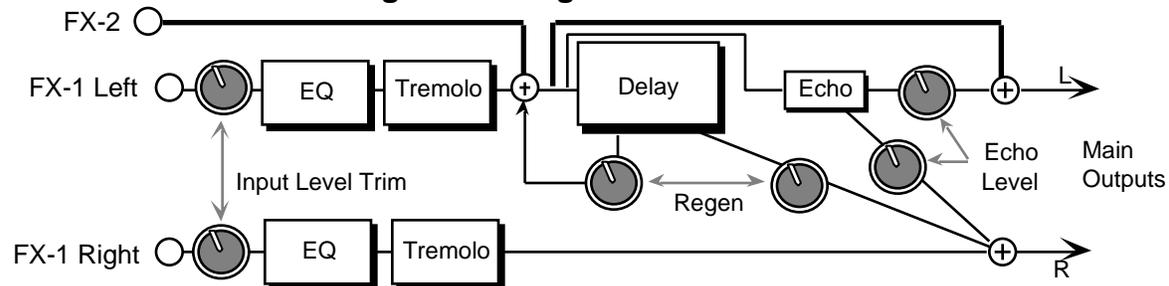
TIME L Range: 0000 to 1600 msec
This parameter sets the delay time for the left side. This is the “ping.”

DLY TIME R Range: 0000 to 1600 msec
Controls the feed forward delay time for the right side. This is the “pong.”

55 EQ- -TREMOLO + DELAY

EQ- -TREMOLO + DELAY combines an EQ and a tremolo effect, which is a pulsating change in volume, with a digital delay.

EQ- -TREMOLO + DELAY Signal Routing



The signal enters an input level trim (EQ TRIM) followed by a programmable EQ, and is then routed to the tremolo. The tremolo is routed directly to the output. The left channel signal passes through the digital delay and is routed back into the delay. There is another signal from the delay that is routed to the output on the right side. One regen parameter (DELAY - REGEN) between the delay sends controls the left and right delay level. This constitutes the “ping-pong” effect. There are two echoes that are sent to the left and right outputs respectively. The signal

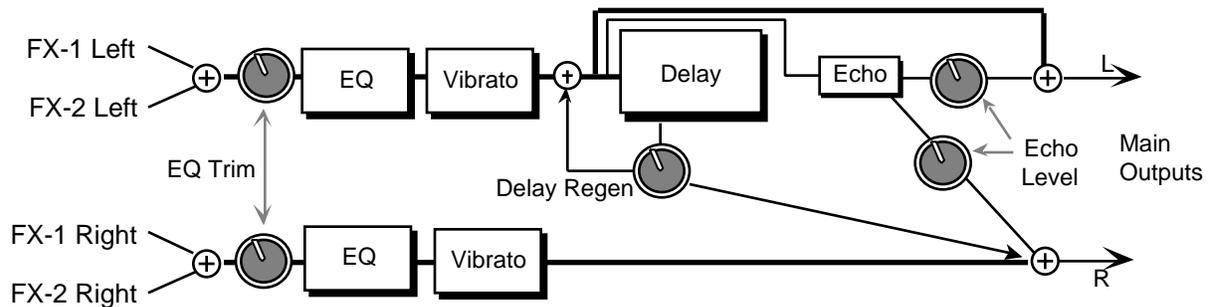
from the two discrete echoes has one level control. There is also an external Dry signal (not shown) that goes directly from the input to the output. The EFFECT MIX FX-1 POST-DDL and FX-2 DDL parameters can be routed into the effect with different Dry/Wet mixes.

- TREMOLO RATE** Range: 000 to 130
Sets the rate of modulation. Mid values create a faster wavering sound. When used in conjunction with the S/H RATE parameter it can create some interesting staccato effects.
- DEPTH** Range: 00 to 99
Sets the depth of amplitude modulation.
- S/H RATE** Range: 000 to 100
Controls the sample rate of a sample and hold network applied to the LFO within the tremolo. When in "Hold," the effect will be to fix the instantaneous amplitude (if the depth is not 00). A setting of 001 will have the largest space between holds. Lower settings create a staccato effect, whereas higher values will increase the amount of samples, making the tremolo flow more smoothly. This parameter can also be turned off (when set to 000).
- L/R LFO** Range: OUT-OF-PHASE or IN-PHASE
Controls whether the left and right channels of the stereo tremolo will modulate IN-PHASE or OUT-OF-PHASE.
- DELAY - REGEN** Range: -99 to +99
Controls the amount of regen applied to the delay time taps. The sign of the value determines the polarity of the regen. A value of +00 will eliminate the audible delay.
- TIME (L and R)** Ranges: 0000 to 1500 msec
These parameters control the time delays for the left and right channel regen delays, and has nothing to do with the tremolo effect.
- ECHO - LEVEL** Range: 00 to 99
Controls the volume of the discrete echo for both the left and right sides.
- TIME (L and R)** Ranges: 0000 to 1500 msec
These parameters control the tremolo echo times for the left and right side. Higher settings yield a deeper echo.
- EQ TRIM** Range: -24 to +0 dB
Allows you to adjust the input volume of the EQs to eliminate the possibility of clipping boosted signals.
- BASS FC** Range: 0000 to 1000 Hz
Selects the cutoff-frequency of the lower-frequency band shelving filter.
- LEVEL** Range: -48 to +24 dB
Sets the amount of boost or cut applied to the low shelving filter.
- TREBLE FC** Range: 01KHz to 15KHz
Selects the cutoff-frequency of the upper-frequency band high shelving filter.
- LEVEL** Range: -48 to +24 dB
Sets the amount of boost or cut applied to the high shelving filter.

56 EQ- -VIBRATO + DELAY

EQ- -VIBRATO + DELAY combines an EQ and a vibrato effect (a pitch shifter modulating over a very small range), with a digital delay. Many vintage guitar amplifiers offered a vibrato control, but don't feel that this effect is limited to guitar sounds, try this with other sources as well. There is a sample & hold parameter that doesn't hold the instantaneous pitch shift, but if set properly will provide a "chirping" effect when acting on the input signal.

EQ- -VIBRATO + DELAY Signal Routing



The signal enters a programmable EQ, which is preceded by an input level trim (EQ TRIM). The signal is then routed to the vibrato. The vibrato is routed directly to the output. The vibrato also passes through the delay which is then regenerated back into the delay. A different delay signal is routed to the output on the right side. This constitutes a "ping-pong" delay effect. The delay REGEN parameter between the delay sends controls the delay feedback amount. There are also two echoes that are sent to the left and right outputs respectively. The signal from the two echoes has one level control. There is also an external dry signal (not shown) that goes directly from the input to the Main Output (DRY). The EFFECT MIX FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

VIBRATO RATE

Range: 00 to 99

Sets the amount of modulation. Higher values create a faster vibrating rate.

WIDTH

Range: 00 to 99

This parameter sets the width (adjusts the amount) of the modulation.

S/H RATE

Range: 000 to 100

Controls the sample rate of a sample and hold network. This is applied to the LFO within the vibrato. When in hold (low values), it causes rhythmic chirps in the pitch of the audio signal. Higher values will increase the number of holds per second, making the vibrato flow more smoothly. The sample and hold function is turned off when set to 000.

L/R LFO

Range: OUT-OF-PHASE or IN-PHASE

Controls the vibrato pitch direction of the left and right channels. When OUT-OF-PHASE, the quadrature pitch change on the left channel will lag 90° from the right. When IN-PHASE, both channels will change pitch together.

DELAY - REGEN

Range: -99 to +99

Controls the amount of positive or negative feedback applied to the regenerated delay. The sign of the value determines the polarity of the feedback. A value of +00 will eliminate any feedback. Controls both left and right levels.

TIME L

Range: 0000 to 1500 msec

Controls the time delay on the left regenerated delay.

- TIME R** Range: 0000 to 1500 msec
Controls the time delay on the right non regenerated delay.
- ECHO - LEVEL** Range: 00 to 99
Controls the volume of the discrete echo for both the left and right sides. A setting of 00 will eliminate any audible echo.
- TIME (L and R)** Ranges: 0000 to 1500 msec
These parameters control the echo times for the left and right sides. Higher settings yield a deeper echo. There are two discrete echoes, one to the left and one to the right.
- EQ TRIM** Range: -24 to +0 dB
Allows you to adjust the input volume before the EQs to eliminate the possibility of clipping boosted signals.
- BASS FC** Range: 0000 to 1000 Hz
This parameter selects the cutoff-frequency of the low shelving filter.
- LEVEL** Range: -48 to +24 dB
Sets the amount of boost or cut applied to the low shelving filter.
- TREBLE FC** Range: 01KHz to 15KHz
Selects the cutoff of the upper-frequency band high shelving filter.
- LEVEL** Range: -48 to +24 dB
Sets the amount of boost or cut applied to the high shelving filter.

57 PITCH SHIFTER

The Pitch Shifters allow you to change the pitch of a signal to any pitch desired within a range of one octave in either direction. The TS-12 offers three different pitch shift algorithms, each designed with a different purpose:

- PITCH SHIFTER offers a splicer type pitch shifter.
- FAST PITCH SHIFTER is a pitch shifter designed for pitch correction.
- PITCH SHIFTER + DELAY combines a pitch shifter with a DDL (described later).

These algorithms sound best with an Effect Mix of wet and dry. You can assign a modulation controller for the Effect Mix parameters to bring in or fade out the pitch shifted signal. Try the different pitch shifters until you find the one that works best with your sound source, and for your application. This first algorithm is a “splicer type” of pitch shifter, which means that it drops or adds small sections of the original signal to the effect. PITCH SHIFTER does not incorporate zero crossing detection. This pitch shifter is best used for a doubling effect. Splicer type pitch shifters are popular because for low pitch shift ratios, splicing is infrequent. These pitch shifters can create very interesting stereo fields by panning each of two pitch shifted voices selectively, and because of the inherent time delay modulation of the algorithm. The FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

- VOICE-1 SEMI** Range: -12 to +12
Allows you to adjust the pitch of Voice-1 to an octave above or below the original pitch in semi-tones (half steps).

FINE Range: -99 to +99

Lets you to fine tune the pitch of Voice-1.

LEVEL Range: 00 to 99

Allows you to adjust the level of Voice-1. A setting of 00 would eliminate any audible pitch shift.

PAN Range: -99 to +99

Allows you to assign the location of Voice-1 in the stereo field. A value of -99 would be far left, and +99 would be far right.

VOICE-2 SEMI **LEVEL**

FINE **PAN**

These parameters are identical to the VOICE-1 parameters, and allow you to define a second voice for independent pitch shifting.

PITCH SHIFTER - QUALITY Range: LONG/SMOOTH or SHORT/COARSE

Allows you to choose between a long/smooth setting, or a short/coarse setting. A smooth setting would sound best with slower sustaining chords, whereas a coarse setting would enhance a rapidly played musical passage. Depending on your sound source and musical needs, set this parameter accordingly. This parameter actually controls the effect transport delay; smooth yields a long transport delay, coarse yields a short transport delay.

LFO - RATE Range: 00 to 99

Controls the rate of pitch modulation that creates a chorusing effect. To achieve chorusing, this rate must be very low.

WIDTH Range: 00 to 99

Controls the excursion of pitch modulation. Since the rate is usually very low, then the width is usually very large.

Note: When KBD is selected as a MOD SRC, and VOICE-1 SEMI or VOICE-2 SEMI is selected as the DEST (destination), the pitch will increase one semitone at a time above middle C (C4), and decrease one semitone at a time below middle C (Middle C being zero). After each octave, the pitch shift will “wrap” and start again (the pitch can't be modulated more than one octave in either direction).

58 FAST PITCH SHIFTER

FAST PITCH SHIFTER has a transport delay of only 10 msec and a maximum detune ratio of one semitone. Try shifting the voices slightly in both positive and negative values to create a fat sound. This algorithm should be used for pitch correction (for instance, try using the mod wheel as a pitch controller). The FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes. Depending on its usage, this algorithm generally sounds best with a Mix of dry and wet. Try using the mod wheel with the Effect Mix parameter(s) to bring in or fade out the pitch shifted signal(s).

VC-1 FINE Range: -99 to +99

Allows you to fine tune the pitch of Voice-1.

LEVEL Range: 00 to 99

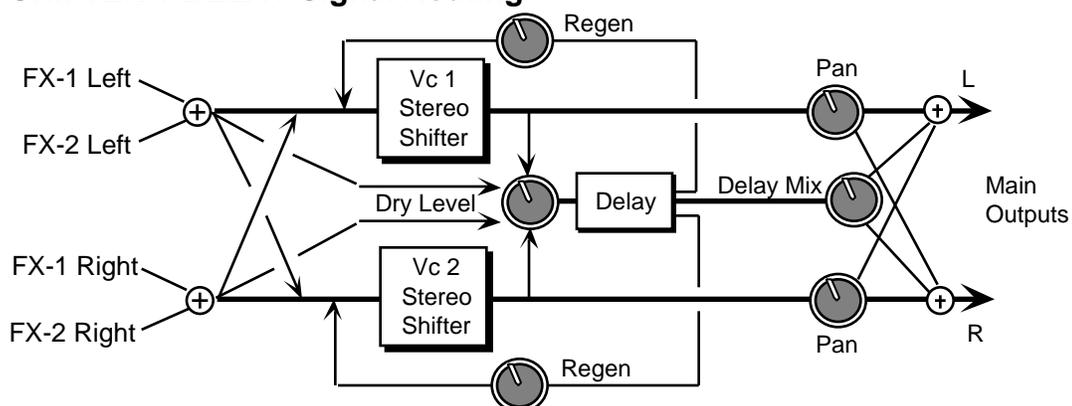
Allows you to adjust the volume of Voice-1. A setting of 00 would eliminate any audible pitch shift.

- PAN** Range: -99 to +99
This parameter allows you to assign the location of Voice-1 in the stereo field. A value of -99 would be far left, and +99 would be far right.
- VC-2 FINE** Range: -99 to +99
This parameter allows you to fine tune the pitch of Voice-2.
- LEVEL** Range: 00 to 99
This parameter allows you to adjust the volume of Voice-2. A setting of 00 would eliminate any audible pitch shift.
- PAN** Range: -99 to +99
Allows you to assign the location of Voice-2 in the stereo field. A value of -99 would be far left, and +99 would be far right.
- LFO RATE** Range: 00 to 99
Controls the rate of pitch modulation that creates a chorusing effect. To achieve chorusing, this rate must be very low.
- WIDTH** Range: 00 to 99
Controls the excursion of pitch modulation. Since the rate is usually very low, then the width is usually very large.

59 PITCH SHIFTER + DELAY

PITCH SHIFTER + DELAY combines a pitch shifter with a digital delay. PITCH SHIFTER + DELAY uses a continual crossfading technique of pitch shifting. This technique maintains the stereo field exactly. This pitch shifter works best for large pitch shift ratios, in some circumstances. Another feature of this algorithm is a digital delay that feeds back into the pitch shift. This feature allows spiraling upward or downward pitch shifts. The EFFECT MIX FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes. This algorithm sounds best with a Mix of wet and dry. Try using a modulation controller for this parameter to fade in or fade out the pitch shifted signal.

PITCH SHIFTER + DELAY Signal Routing



- VOICE-1 SEMI** Range: -12 to +12
Allows you to adjust the pitch of Voice-1 up to an octave above or below the original pitch in semi-tones.

- FINE** Range: -99 to +99
Allows you to fine tune the pitch of Voice-1.
- LEVEL** Range: 00 to 99
This parameter adjusts the volume of Voice-1.
- PAN** Range: -99 to +99
Allows you to assign the location of Voice-1 in the stereo field. A value of -99 would be far left, and +99 would be far right.
- VOICE-2 SEMI** **LEVEL**
FINE **PAN**
These parameters are identical to the previous ones, and control Voice-2.
- DELAY REGEN** Range: -99 to +99
Controls the amount of feedback from the output of the delay back into the input of the pitch shifter. This allows you to create special effects with ascending/descending delays.
- TIME (L and R)** Ranges: 0000 to 1500 msec
These parameters control the amount of time for the pitch shifted signal to delay from the left and right inputs. The left and right delay times are completely independent.
- MIX** Range: 00 to 99
Controls the mix between the delay signal and the pitch shifted signal. A setting of 00 would be all pitch shifter, and no delay. A setting of 99 will be all delay and no direct pitch shift.
- DRY LEVEL** Range: 00 to 99
Lets you to bypass the pitch shifter with an internal dry signal, and send it through the digital delay. Higher values would send more of the dry signal to the delay. The purpose of this parameter is to mix the dry signal appropriately with the pitch shifted delay signals.

60 ROTARY SPEAKER + REV

A rotating speaker simulation with reverb and distortion. Assign a voice to FX-1 to get reverb after the rotary speaker with distortion, or use FX-2 for reverb only. There are Variations on the first sub-page for the Rotary Speaker without Distortion.

- DIST INPUT/OUTPUT** Ranges: 00 to 99
The DIST INPUT parameter determines the input signal gain into the amplifier simulation, creating a tube-like overdrive.
- The OUTPUT parameter controls the *output* of the amplifier distortion. There is a (fixed) clean path in parallel with the distortion. Therefore, to eliminate distortion, set this parameter to 00.
- FILTER** Range: 00 to 99
A three-pole, low pass filter following the amplifier simulation. Controls the filter cutoff resulting in a brighter sound (for higher values) or a darker sound (low values).
- SPKR GAIN** Range: 00 to 99
Controls the level of the signal (distorted or not) applied to the rotary speaker. High gain will simulate a broken speaker. Also use higher settings when using little or no distortion, because distortion raises the signal level to the speaker.

- ROTOR SLOW** Range: 00 to 99
Determines the rate of the rotary speaker when in the “Slow” setting. ROTOR SLOW determines the manual level for the rotary speaker rate when SPEED= SLOW, or when the selected modulator is at zero output level. Again, the higher the value, the faster the rate.
- FAST** Range: 00 to 99
Determines the rate of the rotary speaker when in the “Fast” setting. The higher the value, the faster the rate.
- INERTIA** Range: 00 to 99
Determines how long it will take for the rotor effect to speed up and slow down after switching from fast to slow or vice versa. Adjust this parameter to simulate the effect of the rotary speaker gradually picking up speed.
- SPEED** Range: SLOW or FAST
Determines how the rotary speaker will switch between slow and fast speeds. The behavior of the switch accurately reflects an actual rotary speaker, taking time to speed up or slow down, based on the value of the INERTIA parameter (see previous description). Any effect modulator can act as the SPEED controller. How the modulators will switch the rotor speed fall into two categories:
- WHEEL, PBEND, PEDAL, TIMBR, XCTRL, PRESS(ure), KEYBD, and VELOC — These modulation sources act like a switch to turn on or off the fast rotor speed. To reverse the polarity of the switch, set ROTOR SLOW faster than ROTOR FAST.
 - KEYDN, PATCH, SUSTN, SOSTU, FX-SW — These modulation sources toggle the rotor speed between slow and fast. Every time the modulation source moves from zero in a positive direction, the rotating speaker effect changes speeds from slow to fast or fast to slow.
- DECAY TIME** Range: 0.20 to 100.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.
- HF - DAMPING** Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.
- DIFFUSION** Range: 00 to 99
Determines whether the early reflections will appear as a series of discrete echoes (lower values) or will be more diffused (higher values).

61 SPEAKER CABINET

SPEAKER CABINET simulates the warm sound of an open-back speaker cabinet. SPEAKER CABINET is fabulous for a guitar, bass or any other stringed instrument sound. This algorithm contains the resonances and the non linearity of a real musical instrument speaker. The FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes. For a brighter speaker emulation, try using TUNABLE SPEAKER.

- OUTPUT GAIN** Range: -48 to +24 dB
Since speaker cabinets are “lossy,” output gain is required to compensate losses in perceived volume. Setting this gain too high will cause clipping of the output signal.

62 TUNABLE SPEAKER

Tunable Speaker offers an EQ controllable speaker sound that is brighter than SPEAKER CABINET. By tuning three parametric filters, you can simulate many different speaker cabinet sounds that are used in all styles of music. The FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

MID-1 FC Range: 0000 to 9999 Hz
This parameter sets the center of the mid-frequency parametric. Higher values have a brighter sound.

Q Range: 01 to 18
This parameter is a bandwidth control that determines the width of the resonant peak at the center of the-frequency band. By raising the value, you can produce a narrower bandwidth.

LEVEL Range: -48 to +24 dB
This parameter sets the amount of cut (negative values) or boost (positive values) applied to this mid-frequency parametric.

MID-2 FC	MID-3 FC
Q	Q
LEVEL	LEVEL

These parameters are similar to the previous ones, but can be assigned to control different bandwidths within the mid-range.

INPUT LEVEL Range: -24 to +00 dB
Lets you to adjust the input level before the EQs to eliminate the possibility of clipping boosted signals.

OUTPUT LEVEL Range: -48 to +24 dB
Since speaker cabinets are “lossy,” output gain is required to compensate for losses in perceived volume. Setting this gain too high will cause clipping of the output signal.

63 GUITAR AMP 1

64 GUITAR AMP 2

These algorithms recreate the warm sound of a guitar tube amplifier. They do this by emulating tube distortion characteristics. These algorithms are good for all stringed instrument sounds. GUITAR AMP 1, designed for Hard Rock, offers more distortion than GUITAR AMP 2, which is optimized for “bluesy” type sounds. The EFFECT MIX FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

PREAMP GAIN Range: -48 to +48 dB
This parameter adjusts the amount of boost or cut applied to the incoming signal. We recommend a setting of +0 dB, since these emulations were optimized for distortion there. Lower preamp gains will result in less distortion, while higher preamp gains will yield clipping distortion. For low preamp gain, it may be desirable to use low tube bias values.

MAIN LEVEL Range: 00 to 99
Controls the output level of the main amp before the output EQ.

TUBE BIAS Range: 00 to 99
For preamp gains approximately 00 dB, this parameter controls the emphasis of even to odd harmonics which determines the tone of the amp; mid values emphasize even harmonics and offer a warmer (“glowing tube”) sound, while the highest values may sound like tubes going

bad. Tube bias and preamp gain are independent parameters. For low preamp gain, it may be desirable to use low tube bias values, because this more closely imitates the operation of a real amplifier.

- PREAMP EQ TRIM** Range: -24 to +00 dB
Controls the input level to the pre-amp EQ to eliminate the possibility of clipping boosted signals.
- HIGH FC** Range: 4 to 1000 Hz
Filters out the low frequencies before the preamp. The higher the value, the less low frequencies pass through.
- MID FC** Range: 0000 to 9999 Hz
Determines the center-frequency of the parametric filter before the preamp. Higher values have a brighter sound.
- Q** Range: 01 to 18
Determines the width of the resonant peak at the parametric filter center-frequency. While the Filter center parameter determines where (at what-frequency) this peak will occur, the Q setting controls the presence of the peak.
- LEVEL** Range: -48 to +24 dB
Adjusts the amount of boost or cut applied to the parametric filter in front of the preamp.
- GATE - OFF** Range: -96 to +00 dB
Sets the lower threshold level at which the noise gate shuts off the audio.
- ON** Range: -96 to +00 dB
Sets the upper threshold level at which the noise gate passes the audio. The higher second threshold prevents false “turn ons.”
- RELEASE** Range: 1 msec to 10.0 sec
Sets the amount of time after the signal has elapsed for the noise gate to shut down. For a longer sustain, set this parameter higher.
- HIGH FC** Range: 4 to 1000 Hz
Filters out the low frequencies of the main amp prior to the speaker. The higher the value, the less low frequencies pass through.
- LOW FC** Range: 2.0 to 15.0 KHz
Filters out the high frequencies of the speaker. The lower the value, the less high frequencies pass through. This speaker filter is less selective than the speaker cabinet emulation algorithms.
- MAIN EQ MID-1 FC** Range: 0000 to 9999 Hz
Determines the filter center-frequency of the parametric in the main amp stage. Higher values have a brighter sound.
- Q** Range: 01 to 18
Determines the width of the resonant peak of the filter center. While the Filter center parameter determines where (at what-frequency) this peak will occur, the Q setting controls the presence of the peak.
- LEVEL** Range: -48 to +24 dB
Adjusts the amount of boost or cut applied to the main amp parametric.

- MAIN EQ MID-2 FC** Range: 0000 to 9999 Hz
Determines the filter center-frequency of the second parametric in the main amp stage. Higher values have a brighter sound.
- Q** Range: 01 to 18
Determines the width of the resonant peak of the second filter center.
- LEVEL** Range: -48 to +24 dB
Adjusts the amount of boost or cut applied to the second main amp parametric.

65 GUITAR AMP 3

GUITAR AMP 3 combines an inverse expander with a bright distortion for amp lead sounds. The inverse expander may be thought of as a compressor that amplifies all signals below the threshold. This algorithm is good for heavy metal and hard rock guitar solos. The FX-1 and FX-2 parameters can be routed into the effect with different Dry/Wet mixes.

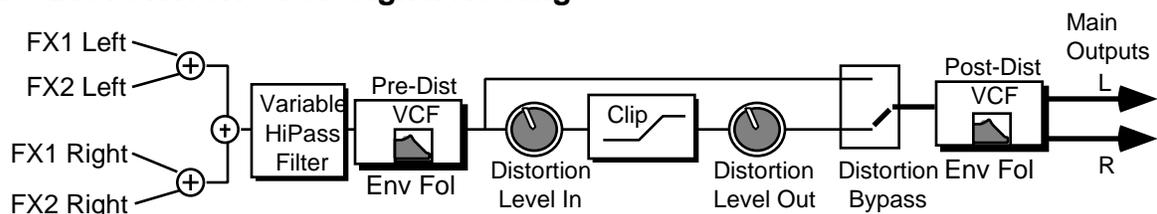
- PREAMP GAIN** Range: -48 to +48 dB
Adjusts the amount of boost or cut applied to the EQ'd incoming signal. Lead sounds are obtained using high gain.
- MAIN LEVEL** Range: 00 to 99
Controls the output level before the output EQ.
- EXPANDER - RATIO** Range: 1:1 to 40:1, infinity
Sets the amount of inverse expansion. Expansion occurs below the threshold. If this is set to 3:1 for example, it will expand the change in signals below the threshold by three times in an attempt to make the signal amplitude approach the threshold level.
- THRESH** Range: -96 to +00 dB
Sets the inverse expander threshold level. Signals beneath this level will be expanded, while signals that are above will be unaffected. As the input signal dies away below the threshold, the expander will increase the gain of the signal.
- PREAMP EQ TRIM** Range: -24 to +00 dB
Controls the input level to the preamp EQ to eliminate the possibility of clipping boosted signals.
- MID FC** Range: 0000 to 9999 Hz
Determines the filter center-frequency of the parametric in the preamp stage. Higher values have a brighter sound.
- Q** Range: 01 to 18
Determines the width of the resonant peak at the filter center. While the Filter center parameter determines where (at what-frequency) this peak will occur, the Q setting controls the presence of the peak.
- LEVEL** Range: -48 to +24 dB
This parameter adjusts the amount of boost or cut applied to the preamp parametric.
- GATE - OFF** Range: -96 to +00 dB
Sets the lower threshold level at which the noise gate shuts off the audio.

- ON** Range: -96 to +00 dB
Sets the upper threshold level at which the noise gate passes audio. This higher second threshold prevents false “turn ons.”
- RELEASE** Range: 1 msec to 10.0 sec
Sets the amount of time after the signal has elapsed for the noise gate to shut down. For a longer sustain, set this parameter higher.
- HIGH FC** Range: 4 to 1000 Hz
Filters out the low frequencies of the main amp prior to the speaker. The higher the value, the less low frequencies pass through.
- LOW FC** Range: 2.0 to 15.0 KHz
Filters out the high frequencies of the speaker. The lower the value, the less high frequencies pass through. True speaker emulations are provided as separate algorithms.
- MID-1 FC** Range: 0000 to 9999 Hz
Determines the filter center-frequency of the parametric in the main amp stage. Higher values have a brighter sound.
- Q** Range: 1 to 18
Determines the width of the resonant peak at the filter center. While the Filter center parameter determines where (at what-frequency) this peak will occur, the Q setting controls the presence of the peak.
- LEVEL** Range: -48 to +24 dB
Adjusts the amount of boost or cut applied to the main amp parametric.
- MID-2 FC** Range: 0000 to 9999 Hz
Determines the filter center-frequency of the second parametric in the main amp stage. Higher values have a brighter sound.
- Q** Range: 01 to 18
Determines the width of the resonant peak of the second filter center.
- LEVEL** Range: -48 to +24 dB
Adjusts the amount of boost or cut applied to the second main amp parametric.

66 VCF- -DISTORTION- -VCF

VCF- -DISTORTION- -VCF combines a voltage control filter, a raspy distortion, and a second voltage control filter. Three effects can be obtained: Distortion, Wah-wah, and Auto-wah. The last two functions use the same VCF. These filters can be disabled or used as EQ if desired. The second VCF that exists after the distortion can be set to act like a simple speaker simulator, or it can be modulated in parallel with the pre-distortion VCF.

VCF- -DISTORTION- -VCF Signal Routing



The EFFECT MIX FX-1 and FX-2 parameters can be routed into the algorithm with different Dry/Wet mixes.

- DIST LEVEL - IN** Range: 00 to 99
Controls the gain going into the distortion effect. DIST LEVEL - IN will boost the signal level up to 48 dB. For more distortion, use a high input level gain and turn the OUT down to keep the volume under control. For less distortion, use a low gain input level and a higher output volume.
- OUT** Range: 00 to 99
Controls the gain coming out of the distortion effect. Generally, if the DIST LEVEL - IN is set high, set this parameter lower to control the volume.
- BYPASS** Range: OFF or ON
Allows you to bypass the distortion (as shown on the signal routing diagram).
- PRE-EQ HIGH FC** Range: 0000 to 1000 Hz
Filters out the low frequencies before the EQ. The higher the value, the less low frequencies will pass through.
- PRE-DIST VCF FC** Range: 01 to 99
Determines the filter cut off-frequency before the distortion. Higher values have a brighter sound. This parameter can be modulated, using a CV Pedal for a wah-wah pedal effect. To disable the distortion filter, set this parameter to 99. To use as an EQ, set the desired value and make sure ENV AMT is +00. To use as the auto-wah, set this parameter close to 01 (lower values) and turn on ENV AMT.
- Q** Range: 01 to 25
Determines the level and width of the resonant peak at the filter cutoff point. While the PRE-DIST VCF FC parameter determines where (at what-frequency) this peak will occur, the Q setting controls the *presence* of the peak. This setting is important for the auto-wah effect.
- ENV AMT** Range: -99 to +99
Determines how much the amplitude of the incoming signal will modify the distortion filter cutoff-frequency. When set to +00, no modification will occur. When set to mid positive values, the PRE-DIST VCF FC will go high, but then come down to its nominal setting. When set to negative mid values, the PRE-DIST VCF FC will go low, and then go back up to its nominal setting. How quickly it does so is determined by the ATTACK and RELEASE parameters. This sound is the auto-wah; positive values will boost the high frequencies, offering an “oww-oww” sound, and negative values will cut the high frequencies, producing a “dweep-dweep” sound.
- POST-DIST VCF FC** Range: 01 to 99
Determines the filter cut off-frequency *after* the distortion. Higher values have a brighter sound. This parameter can also be modulated, using a CV Pedal for a wah-wah pedal effect. To disable the post-distortion filter, set this parameter to 99.
- Q** Range: 01 to 25
Determines the level and width of the resonant peak at the filter cutoff point. While the POST-DIST VCF FC (filter cutoff) parameter determines where (at what-frequency) this peak will occur, the Q setting controls the presence of the peak. This setting is important for the auto-wah effect.
- ENV AMT** Range: -99 to +99
Determines how much the amplitude of the incoming signal will modify the distortion filter cutoff-frequency. When set to +00, no modification will occur. When set to mid positive values, FC will go high, but then come down to its nominal setting. When set to negative mid values, FC

will go low, and then go back up to its nominal setting. How quickly it does so is determined by the ATTACK and RELEASE parameters. This sound is the auto-wah; positive values will boost the high frequencies, offering an “oww-oww” sound, and negative values will cut the high frequencies, producing a “dweep-dweep” sound.

ATTACK Range: 50 μ sec to 10.0 sec
Sets the attack of the envelope follower (i.e. determines how closely the attack is followed) once the incoming signal has been detected. Generally the attack should be short.

RELEASE Range: 1 msec to 10.0 sec
Sets the amount of time after the incoming signal has ceased for the envelope follower to shut down. Generally these times are longer than the attack times.

67 WAH- -DISTORTION + REV

A guitar and amp simulator, featuring distortion, compression, reverb, and a resonant filter following the amplitude of the signal. Assign a sound to FX-1 for reverb after Wah distortion, or use FX-2 for reverb only.

DIST INPUT and OUTPUT Ranges: 00 to 99
These two parameters control the levels going into and coming out of the distortion effect. For more distortion, use a high input level and turn the output level down to keep the volume under control. For less distortion, use a low input level and a higher output level.

WAH - CENTER Range: 00 to 99
Determines where the resonant peak of the wah will occur. High values yield a higher pitched wah.

RANGE Range: -99 to +99
Controls how much depth the wah will have. This is analogous to how far you move a wah-wah pedal back and forth.

DECAY TIME Range: 0.20 to 100.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.

HF - DAMPING Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.

FEEDBACK Range: -99 to +99
Controls the amount of signal applied from the output of the reverb back into the input of the compressor. The sign of the value determines the polarity of the feedback.

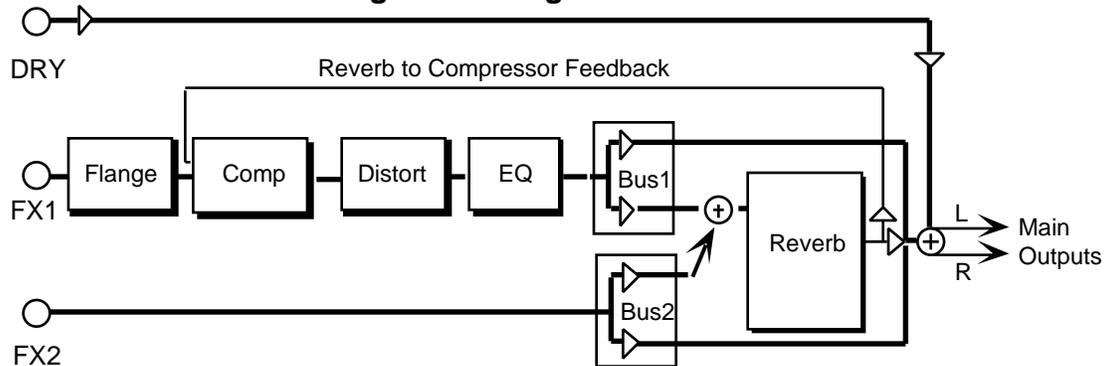
Note: Since the feedback level is taken from FX-1, if the Effect Mix for FX-1 is set to 00 or a low value, feedback will have little or no consequence. Also, it is important to note that since the signal is being taken from the reverb, which is also fed by FX-2, voices sent to FX-2 will enter the feedback loop along with the FX-1 signals.

COMPRESSOR THRESH Range: 00 to 99
Controls the threshold level for the compressor. As the input signal dies away below the threshold, the compressor will increase the gain of the system, causing feedback to increase as well. Normal compression is “72.”

68 FLNG- -CMP- -DIST + REV

A screaming guitar-and-amp simulator that features not only compression, distortion, and reverb, but flanging and EQ as well. FX-1 routes the signal through each of these effect processors, while FX-2 is used for reverb only.

FLNG- -CMP- -DIST + REV Signal Routing



COMPRESSOR THRESH

Range: 00 to 99

Controls the threshold level for the compressor. As the input signal dies away below the threshold, the compressor will increase the gain of the system, causing feedback to increase as well. Normal compression is "72."

FLANGE RATE

Range: 00 to 99

Controls the rate of modulation of the notches due to the flanger effect. A setting of 00 effectively turns the flanger off.

DIST INPUT and OUTPUT

Ranges: 00 to 99

Control the levels going into and coming out of the distortion effect. For more distortion, use a high input level and turn the output level down to keep the volume under control. For less distortion, use a low input level and a higher output level.

FILTER - LOW FC/HIGH FC

Ranges: 00 to 99

The LOW FC parameter filters out high frequencies after the distortion signal path. The lower the value, the less high frequencies pass through. The HIGH FC parameter filters out low frequencies after the distortion signal path. The higher the value, the less low frequencies pass through.

DECAY TIME

Range: 0.20 to 100.0 msec

Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.

HF - DAMPING

Range: 00 to 99

Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.

FEEDBACK

Range: -99 to +99

Controls the amount of signal applied from the output of the reverb back into the input of the compressor. The sign of the value determines the polarity of the feedback.

Note: Since the feedback level is taken from FX-1, if the Effect Mix for FX-1 is set to 00 or a low value, feedback will have little or no consequence. Also, it is important to note that since the signal is being taken from the reverb, which is also fed by FX-2, voices sent to FX-2 will enter the feedback loop along with the FX-1 signals.

69 DISTORT + CHORUS- -REV

A brighter guitar-and-amp simulator that features distortion, chorus, and reverb, but without the compressor. The FX-1 and FX-2 MIX parameters can be routed into the effect with different Dry/Wet mixes.

- DIST MIX** Range: 00 to 99
Determines the Dry/Wet, or in this case, dirty/clean mix of the signal. A value of 00 yields a clean signal; 99 yields an all distortion signal.
- INPUT and OUTPUT** Ranges: 00 to 99
These two parameters control the levels going into and coming out of the distortion effect. For more distortion, use a high input level and turn the output level down to keep the volume under control. For less distortion, use a low input level and a higher output level.
- FILTER - FC** Range: 00 to 99
This determines the filter cutoff-frequency (brightness) of the distortion.
- Q** Range: 01 to 25
Determines the level of the resonant peak at the filter cutoff point. While the FILTER - FC parameter determines where (at what-frequency) this peak will occur, the Q setting controls the presence of the peak.
- CHORUS MIX** Range: 00 to 99
Controls the Dry/Wet mix within the chorus itself.
- RATE** Range: 00 to 99
Controls the four rates of modulation of the delay time of the chorus. The delay modulation produces vibrato and tremolo.
- WIDTH** Range: 00 to 99
Controls the depth of vibrato and tremolo.
- DECAY TIME** Range: 0.20 to 100.0
Controls the amount of time it takes for the reverberation to decay to a low level (-60 dB) after the input signal stops.
- EARLY REF LEV** Range: 00 to 99
Controls the level of pre-echoes of the input signal added directly to the reverb output.
- HF - DAMPING** Range: 00 to 99
Controls the rate of attenuation of high frequencies in the decay of the reverberation. As natural reverb decays, some high frequencies tend to get absorbed by the environment. Increasing the value of this parameter will filter out increasing amounts of high-frequency energy.
- BANDWIDTH** Range: 00 to 99
Acts as a low pass filter on the signal going into the reverb, controlling the amount of high frequencies that will pass into the effect. The higher the setting, the more high frequencies are allowed to pass.
- LF DECAY** Range: -99 to +99
This control will boost or cut the rate at which low frequencies will decay.

DETUNE - RATE Range: 00 to 99
 Controls the LFO rate of detuning incorporated within the reverb. Detuning creates a slight pitch shift into the reverberated signal, giving it a more natural sounding decay by breaking up resonant nodes.

DEPTH Range: 00 to 99
 Controls the depth of the detuning, that is, how much the pitch will change. Low values yield a metallic sound. Some voices sound best with very low values.

70 PARAMETRIC EQ

PARAMETRIC EQ offers a minimum phase four band parametric EQ.

EQ TRIM Range: -24 to +00 dB
 Allows you to adjust the input level trim to the EQs to eliminate the possibility of clipping boosted signals.

BASS FC Range: 0000 to 1000 Hz
 Sets the center of the low-frequency parametric.

LEVEL Range: -48 to +24 dB
 Sets the amount of boost or cut applied to this low-frequency parametric.

TREBLE FC Range: 01 to 15 KHz
 Sets the center-frequency of the high-frequency parametric.

LEVEL Range: -48 to +24 dB
 Sets the amount of boost or cut applied to this high-frequency parametric.

MID-1 FC Range: 0000 to 9999 Hz
 Sets the center of the mid-frequency parametric.

Q Range: 01 to 18
 This parameter is a bandwidth control that determines the width of the resonant peak at the center-frequency band. By raising the value you can produce a narrower bandwidth.

LEVEL Range: -48 to +24 dB
 Sets the amount of boost or cut applied to this mid-frequency parametric.

MID-2 FC

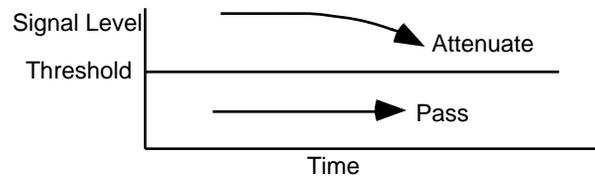
Q

LEVEL

These three parameters are identical to the previous three parameters, and are used to control different bandwidths within the mid range.

71 EQ- -COMPRESSOR

EQ- -COMPRESSOR combines an EQ with a full-feature compressor. For high compressor ratios, this algorithm functions as a limiter. This algorithm operates by compressing (attenuating) signals above the threshold and passing the signals below the threshold. For higher ratios and lower thresholds, this algorithm can be used to create sustain. EQ exists in both signal and side chain paths.



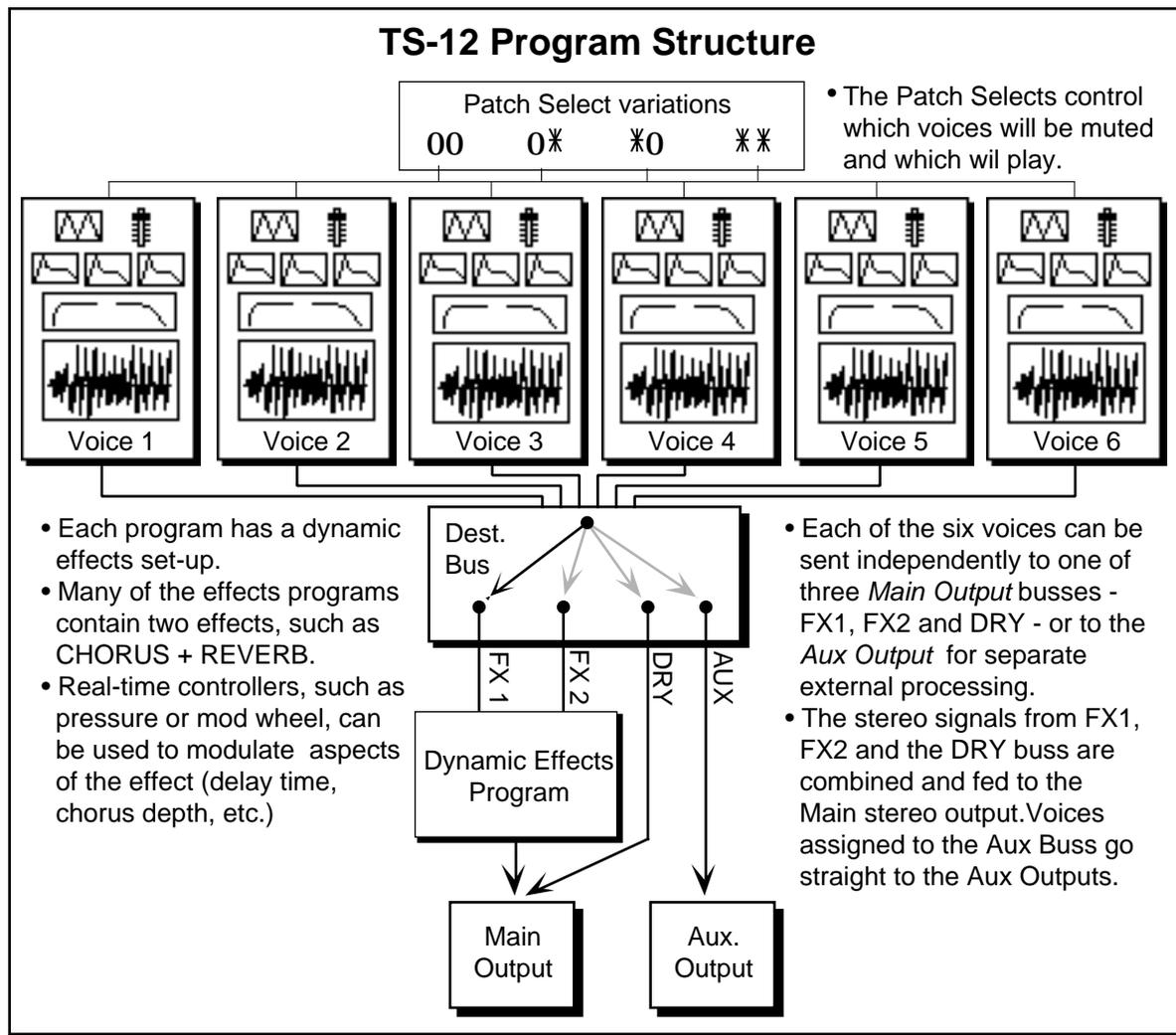
- COMPRESSOR RATIO** Range: 1/1 to 40/1, infinity
Sets the amount of compression. The range is based on decibels (dB) above the threshold. If this is set to 4/1 for example, it will compress changes in signals above the threshold by one quarter. When this is set to infinity, it acts as a limiter.
- THRESH** Range: -96 to +00 dB
Sets the threshold level. Signals that exceed this level will be compressed, while signals that are below will be unaffected. To turn off the compressor, set the level to +00 dB.
- ATTACK** Range: 50 μ sec to 100 msec
Determines the attack rate after the initial signal has been detected and before the compression takes affect.
- RELEASE** Range: 01 msec to 10.0 sec
Determines how long it takes for the compression to be fully deactivated after the input signal drops below the threshold level. This is generally chosen longer than the attack time.
- GATE - OFF** Range: -96 to +00 dB
Sets the lower threshold level at which the noise gate shuts off the audio.
- ON** Range: -96 to +00 dB
Sets the upper threshold level at which the noise gate passes audio. This higher second threshold prevents false "turn ons."
- RELEASE** Range: 1 msec to 10.0 sec
Determines how long it takes for the gate to be fully released after the input signal drops below the threshold level. Lower settings yield a quick gate.
- COMPRESSOR - OUTPUT GAIN** Range: -48 to +48 dB
Boosts the compressed signal level.
- EQ TRIM** Range: -24 to +00 dB
Allows you to adjust the input volume of the EQs, to eliminate the possibility of clipping boosted signals.
- BASS FC** Range: 0000 to 1000 Hz
Sets the cutoff-frequency of the lower-frequency band shelving filter.
- LEVEL** Range: -48 to +24 dB
Sets the amount of boost or cut applied to the low shelving filter.
- TREBLE FC** Range: 01KHz to 15KHz
Sets the cutoff-frequency of the upper-frequency band high shelving filter.
- LEVEL** Range: -48 to +24 dB
Sets the amount of boost or cut applied to the high shelving filter.

Section 8 — Understanding Programs

In this section, we will show you how to edit a TS-12 Program. For detailed descriptions of the many parameters, refer to the following section.

What is a Program?

A Program (or *sound* as we sometimes refer to it) is made up of six *voices* and one *effect*. The status of the two Patch Select buttons determines which of those six voices will play at any given time. The diagram below illustrates the make-up of a TS-12 program:



Understanding Voices and Polyphony

When referring to the number of voices in a program, we are *not* talking about polyphony (as in “you can only play so many notes”). Instead, we are referring to the number of voices that will sound on each key as you play the program. The TS-12 is unique in that it lets you choose the number of voices (from one to six) per key for each program.

The TS-12 has a total of 32 voices which are dynamically assigned to the different sounds that you play (31 voices when Sampled Sounds are loaded into Dynamic RAM). How many voices a sound uses on each key depends on the program. Many sounds use only one voice — in the case of these sounds, you can play 32 notes before “voice stealing” occurs. On programs that use two voices, you can play 16 notes before any voices are stolen. Three voices, 10 notes, and so on. Up to six voices can be active in one program.

The TS-12 is “smart” about voice allocation — there are a number of things you can do to increase the apparent polyphony of a sound and to minimize the effects of voice stealing. For example:

- As soon as a voice is finished playing (either because it reached the end of the wave or because the volume envelope went to zero), that voice is returned to the pool, and a new note can use that voice rather than stealing one that is still sustaining.
- You can assign low, medium or high priority to each voice in a program, which allows you to control how voices are reassigned.

Using the Patch Select Buttons

The two Patch Select buttons above and to the left of the pitch bend wheel provide instant access to four different variations within each program. When you press either or both of the Patch Select buttons, you are selecting different combinations of the voices that make up a program. For each of the four possible patches, any combination of the six voices can be made to play or to remain silent.

The Patch Select buttons are “momentary” — an alternate patch will only be in effect while the button is held down, unless you “lock in” a patch using the functions on the Patch Select sub-page (found by pressing the **Performance Options** button).

You can see the patches changing, and see which voices are playing for each patch, on the Select Voice page. Press **Select Voice**, then watch the display as you press the **Patch Select** buttons:

- The six voices that make up the program are represented on the display by the name of the wave that each is playing.
- Voices *without* brackets around the name are enabled for that patch and will play.
- Brackets around the name mean that the voice is muted for that patch and will not play.
- Asterisks (*) on both sides of the name mean that the voice is soloed for that patch, and all other voices are muted.

The Patch Select buttons are sent and received over MIDI as MIDI controller #70, and will be recorded and played back by the sequencer like any other controller.

Compare — Using the Compare Button

As soon as you change any parameter in a program, the LED above the **Compare** button will light. It will remain lit until you select another program or save (write) the newly edited program into memory. This is a constant reminder that something in the program has been changed.

To hear the original, unchanged program, press the **Compare** button. The **Compare** LED will go out, and you will hear the original sound and see the page with its original settings. Press **Compare** again to return to your edited program. You can toggle back and forth between the original and the edited sound as often as you like.

Using the Edit Buffer

You can edit a program, while keeping the original program intact, because the edited version is kept in a special area of memory called the *Edit Buffer*. Whenever you change any parameter of a program, the altered program is put in the edit buffer, replacing whatever was previously there. Only one program at a time can reside in the edit buffer — the edit buffer always contains the results of your last edit.

When you press the **Compare** button, you are alternating between the program located in the original memory location and the program located in the edit buffer. We refer to the program in the edit buffer as the *Edit Program*.

You can return to the edit program, even after selecting another program (as long as you don't change any parameters there) by pressing the **Compare** button. This puts you back in the edit buffer, and any changes you make will affect the edit program.

A general rule of thumb: The sound you hear, is the one you're editing.

If you like the result of the changes you have made to a program, you should rename it and save the new program permanently to another location. See "Write Page," later in this section.

Abandoning Your Edits

If you decide, while editing a program, that you're not happy with what you've done, and you want to start over with the original program, just go to the proper Sound Bank location and select the program again. Then you can start editing the program again from scratch. Remember though, you *will* lose the one you were working on before.

Using the Select Voice Page

The Select Voice page is one of the central programming pages of the TS-12. The mute status of each voice is shown on this page, and it is easy to see which voices are being heard and which are selected. Whenever you begin to edit a sound, you should start here so that you know just which voice(s) you are editing.

On the Select Voice page you can:

- select a voice (or group of voices) for editing,
- determine which of the six voices will play (and which will be muted) for each of the four Patch Select variations, or
- temporarily solo any one of the voices without disturbing the other settings on the page.

Press **Select Voice**. The display looks something like this:

Voice 1 is selected

```

SELV  STRINGS    STRINGS    FLUGELHRN  — Voices 1, 2 and 3 are active
OO    (SITAR)     (PIZZ-SECT) (LOOP-KICK) — Voices 4, 5 and 6 are muted

```

Patch Select status

The six locations on the screen represent the six voices which are available within the program. For each voice, the display shows the name of the wave that the voice is assigned to play, and the mute status of the voice in the current patch. When you press the soft button above or below one of these voices, it becomes underlined, indicating that it is the currently selected voice, the one that will be affected by any editing you do.

Voices shown without brackets are active and will play in the current patch. If you press the **Down Arrow** button while on a selected voice, it will mute that voice. Brackets (or parentheses) around the voice name indicate that the voice is muted in the current patch. Pressing the **Up Arrow** button on a muted voice will un-mute it.

Pressing the **Up Arrow** on an active (un-muted) voice will solo that voice. Solo voices are displayed enclosed by asterisks, with all other voices muted. Pressing the **Down Arrow** on a soloed voice will return it and all other voices to their normal status.

Voice 1 is soloed

```

SELV  *STRINGS*   (STRINGS) (FLUGELHORN) — Voices 2 and 3 are muted
OO    (SITAR)     (PIZZ-SECT) (LOOP-KICK) — Voices 4, 5 and 6 are muted

```

Using the soft buttons as a shortcut

Once a voice is selected (underlined):

- If it is active, pressing its soft button again will mute it.
- If it is muted, pressing its soft button will un-mute it.
- Double-clicking will solo the voice. Click once more on a soloed voice to return all voices to normal.

Whenever you are on this page, pressing the **Select Voice** button again will return you to the page you were on prior to entering the Select Voice Page.

Note: If you edit a voice which is muted, you will see the word MUTE flashing in the lower left corner of the display to remind you that you are *not* hearing the results of your edits.

Selecting more than one voice at a time (Group Edit Mode)

Normally, when you are editing voice parameters, you are working on a single parameter within a single voice. In some cases you may want to edit the value(s) of the same parameter in more than one voice simultaneously. For example, you might want to edit the amplitude envelope release time for all active voices in a program at once, saving the time it would take to edit each of the voices individually. This may be accomplished using the special *group edit* feature of the TS-12. Group editing is a temporary state that allows more than one voice to be “selected” on the Select Voice page, and any edits performed while in this group edit state will affect all of the voices which are not muted.

Ordinarily you can only select one voice at a time. However, if you want to edit the same parameter(s) for all the active voices simultaneously, double-click the **Select Voice** button. The Select Voice page will appear with all the active voices in the current patch selected. Now, parameter changes you make on any of the programming pages will affect all the voices currently playing.

Programming pages you select while in group edit mode will appear with “GRP” flashing in the lower left hand corner of the display to remind you that you are editing more than one voice.

Note that while in group edit mode, pressing any of the soft buttons on the Select Voice page will return it to its normal state, where only one voice can be selected at a time.

Using the Group Edit feature

- Make sure that the voices you want to edit are not muted and then *double-click* the **Select Voice** button.
The Select Voice page will be displayed with all of the active voices underlined.
- Perform the desired parameter edits. The **Data Entry Slider** will set the value of all of the parameters being edited to the *absolute* value displayed for the current voice. The **Up/Down Arrow** buttons will affect each parameter *relative* to its current value in each of the voices being edited.
- Changing the mute status of any voice, or selecting a new voice or program, will disable the group edit feature and return the TS-12 to its normal state.

Note that the parameter values displayed when editing in Group Edit mode are the values for the voice which was selected before you entered Group Edit mode, *unless* the previously selected voice was muted and was not included in the group. In this case, you will see the values for the first voice in the group.

This feature can be particularly convenient when you want to simultaneously edit programs with multiple-voice components. Set up a patch select for each of the various sets of voices that you wish to edit together, muting all voices except the set you wish to group. When you wish to edit a particular set, simply set the patch select and then double click **Select Voice** to enter group edit.

Note: The mute status of the patch select which is selected when you double-click **Select Voice** determines which voices are included in the group. It is possible to have muted voices appear in the group if you enter group edit mode from a patch select in which those voices are *not* muted.

Programming the Patch Selects

There can be four variations of the program, one for each of the four possible patch select button positions. The patch selects are used to control which voices in a program are active and which ones are muted. The current patch select variation is shown in the lower-left corner of the display on the Select Voice page. For either button, a “0” indicates that the button is not being pressed, and an asterisk (*) indicates that the button is down.

While on the Select Voice Page, press the **Patch Select** buttons and watch as the display changes to show the status of each patch variation. Note that for each of the four patch select variations, a different combination of voices can be active or muted. This lets you dynamically set up the patches to add or subtract components of the sound. The variations can range from subtle alterations to dramatic changes in the characteristics of the sound that the program produces.

The Patch Select parameter (found on the Performance Options page) controls how the patch selects will operate. If the parameter is set to LIVE, then pressing the **Patch Select** buttons while the Select Voice page is displayed will show the different variations. One of the four patch select variations may be “latched-in” as the current default by changing the value of the Performance Patch Select parameter for the currently selected program. Refer to *Section 4 — Understanding Presets* for more information on controlling the Patch Selects.

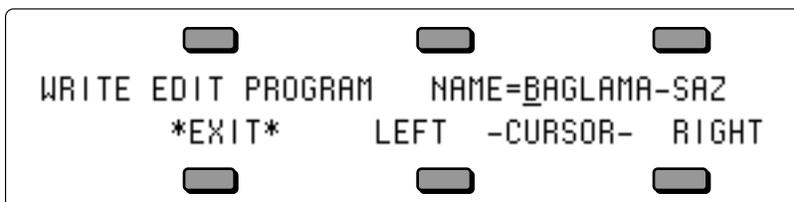
Tip: When programming the patch selects, it is often convenient to be able to instantly latch different Patch Select variations so that you can set up the voice mutes for each variation. You can do this by setting the Performance Options Patch Select parameter to HELD. Refer to *Section 4 — Understanding Presets* for more information.

Write Page — Saving a New Program Into Memory

Once you have modified an existing program or created an entirely new one, you can *write* or save that program to any User RAM location using the Write Page. This page is also used to rename the program with the name of your choice.

When you are ready to save a program into memory, first decide on a name of up to eleven characters for your new program. Then:

- Press **Write Program**. The Write Program page appears as below, with the current program name showing. You will see a cursor, or underline, beneath the first letter of that name.



- Edit the Program Name using the **Data Entry Slider** and the two Cursor soft buttons, labeled LEFT and RIGHT. You can move the **Data Entry Slider** up and down to scroll through the available characters, or step through them one at a time with the **Up/Down Arrow** buttons. Find the first letter you want, then press the RIGHT button to move the cursor to the next location. Repeat this procedure until the display shows the name you have chosen (or if the KBD-NAMING parameter on the System page is ON, you can use the keyboard to enter the name, as explained in *Section 2 — System Page Parameters*).

Tip: Moving the **Data Entry Slider** all the way down gives you a blank space. Also, using dashes, periods and slashes between characters can make a sound name hold together better when displayed on Program Bank and Preset pages.

- Select a memory location for your new program. Press one of the **Bank** buttons (0-9). As long as you hold the button down, the display will show the sound select page for that bank, with two differences:
 - 1) None of the program names are underlined, and
 - 2) the word "SAVE" is flashing in the lower left-hand corner, below the page name.

When you release the **Bank** button, the display will return to the Write page. Press another **Bank** button and the display shows you the programs for that bank. To look at the Programs in the other User RAM BankSet, press and hold down any of the ten **Bank** buttons as before, and then press **BankSet**. You can also press the **Bank** buttons and the **BankSet** button while holding down the **Sounds** button to "shop around" without returning to the Write page each time you release the bank button.

- You may want to audition a few sounds before deciding which to replace. In this case, press the soft button beneath the word *EXIT* on the display. This takes you off the Write Page. Now use the **Bank** and **BankSet** buttons and the soft buttons in the usual way to select and listen to the Programs in memory. Your new Program is still safe in the TS-12's edit buffer.

Warning:

While you're doing this, DO NOT use the data entry controls to change any parameters in the programs you audition, as this would instantly replace your hard-earned new Program in the Edit Buffer with something else entirely.

When you are through listening, return to the program you want to save by pressing the

Compare Button. The **Compare** LED will light. Now press **Write Program** to return to the Write Page. Your new program and its new name should still be in the edit buffer intact.

To Save the Program

- Press the appropriate **Bank** button, and *while holding it down*, press the soft button which corresponds to the program you wish to write over. This writes the new program, with its new name, into that memory location.

The display momentarily shows WRITING PROGRAM - PLEASE WAIT. The TS-12 will display the bank where the new program has just been saved. The new program is underlined, and is selected as the current program.

EXIT

The button beneath the word *EXIT* can be pressed at any time to exit the Write Page and return to the page you were on before entering it.

Copying an Existing Program to Another Location

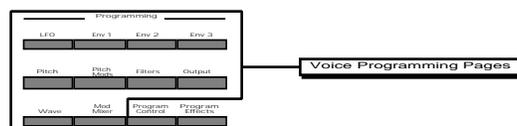
Sometimes you'll want to take an existing program, one that you haven't been editing, and simply copy it to another memory location. For example, you might want to put the six most commonly used programs in the same bank, for easy access during performance.

To do this, you will use the Copy function. Normally the Write page "looks" only at the edit buffer, but you can use the Copy function to place an existing program onto the Write page:

- Select the program you want to copy.
- Press the **Copy** button. The *Copy Context* on the top line of the display shows PROGRAM PARAMETERS.
- Press the soft button beneath MAKE COPY. This puts the current program into the copy buffer. The display briefly shows COPY COMPLETED and then returns to the Copy page.
- Press the RECALL soft button. This puts you back on the Write page, with the new program showing. Now proceed exactly as described above to write the program to the new location.

Voice Programming

This section covers those functions which can be edited independently for each individual voice within the program.



TS-12 Voice Configuration

Each of the six voices within a TS-12 program consists of:

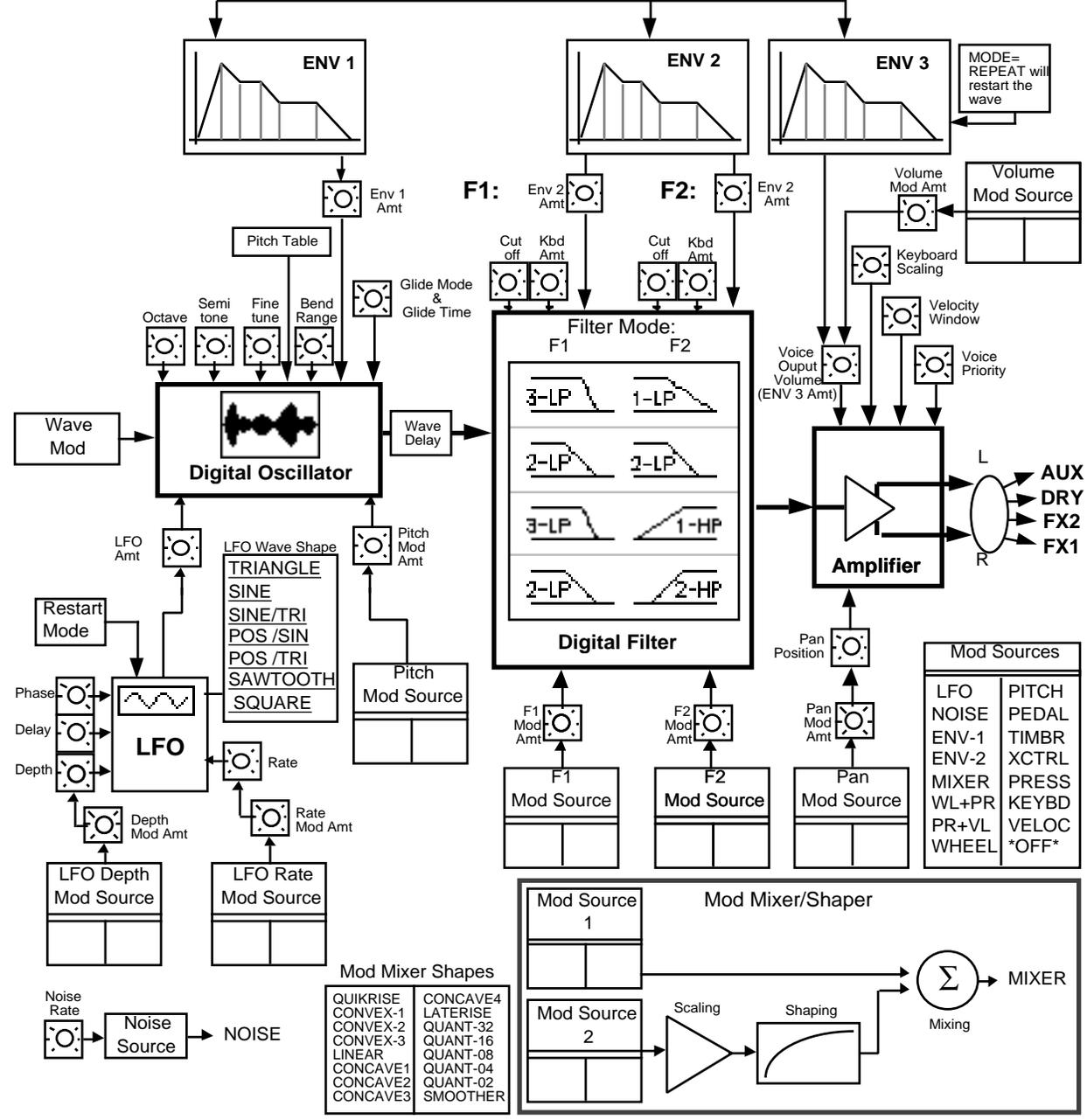
- a digital oscillator playing one of the 254 waves from the TS-12 wave memory
- two multi-mode digital filters
- one LFO (Low Frequency Oscillator)
- three complex envelope generators for controlling volume, pitch, filter frequency, etc.
- a versatile matrix modulation scheme with 15 routable modulation sources

The diagram on the following page shows the configuration of one TS-12 voice.

TS-12 Voice Configuration

Envelope Parameters

Times: Attack, Decay1, 2, 3, Release
Levels: Peak, Break1, 2, Sustain
Velocity to Level
Mode (normal/finish/repeat)
Velocity Curve (first 10 Mod Mixer shapes)
Keyboard tracking of Times
Velocity to Attack Time & Velocity to Release Time



Modulators

About Modulation

To modulate something is simply to cause it to change. With the TS-12, you can set basic, or manual, levels for the volume, pitch, brightness, etc. of a voice, and then modulate those levels in various ways in order to create movement and dynamics.

Suppose you switch on your stereo and turn the volume half way up. This is the manual volume setting. It will stay at that level until it's changed. Now suppose that you take the volume knob of your stereo and begin quickly turning it up and down, so the volume gets continuously louder and softer, louder and softer. What you would be doing is modulating the volume of your stereo. If you were to take the treble control, and do the same to that knob, you would be modulating the brightness of your stereo.

In much the same way we modulate various levels within the TS-12 (though generally the approach is less haphazard). There are 15 different *Modulation Sources* available, and they can each be independently assigned to vary the manual levels for a great many aspects of a voice, including real-time control of some aspects of an effects program.

Selecting a Modulator

On the programming pages where a modulator can be selected to vary the level of some function within an TS-12 voice, the display shows MODSRC=_____ (Modulation Source=). A modulator is chosen by selecting (underlining) that parameter with the appropriate soft button, and then using the **Data Entry Slider** or the **Up/Down Arrow** buttons to select among the 15 available modulation sources.

Tip: Moving the **Data Entry Slider** all the way up selects **OFF**, which is handy if you don't want a modulator applied in a particular location.

Let's take, for example, the Pitch Mods page, which is where you apply modulation to the pitch of a voice. Press **Pitch Mods**. In addition to Envelope 1 and the LFO, which are always available, you can choose an additional modulator to alter the pitch:

	Modulation Source	Modulation Amount
	PITCH MODSRC= <u>*OFF*</u>	MODAMT=+00
	PITCHTBL=SYSTEM	ENV1=+00
		BEND=SYS
		LFO=+04

MODAMT — Modulation Amount

As shown above, where a modulation source is selected, the parameter immediately to its right controls the *Modulation Amount* (the display shows MODAMT=±##), which controls how deeply the selected modulator will affect the level to which it is being applied.

Press the soft button above MODAMT=, and use the data entry controls to adjust the modulation amount. Modulation amount can be positive or negative. A modulation amount of +00 has the same effect as turning the modulator **OFF**.

Tip: With modulation amount, as with all parameter values that have a center value (in this case, +00), there is an easy way to reach that value. With the MODAMT selected, press the **Down Arrow** button and *while holding it down*, press the **Up Arrow** button, then quickly release both buttons. This automatically sets the modulation amount to +00.

Modulation Sources

The 15 Modulation Sources available on the TS-12 are as follows:

• LFO — Low Frequency Oscillator	• PITCH — Pitch Bend Wheel
• NOISE — Noise Generator	• PEDAL — Voltage Control Foot Pedal
• ENV-1 — Envelope 1	• TIMBR — Timbre Control
• ENV-2 — Envelope 2	• XCTRL — External Controller (MIDI)
• MIXER — Mod Mixer/Shaper	• PRESS — Pressure (After-touch)
• WL + PR — Wheel + Pressure	• KEYBD — Keyboard Tracking
• PR + VL — Pressure + Velocity	• VELOC — Velocity
• WHEEL — Modulation Wheel	• *OFF* — no modulation

- **LFO — Low Frequency Oscillator**

The *Low Frequency Oscillator* generates only very low frequency waves, below the audio spectrum, which can produce vibrato, tremolo, and many other effects, depending on the LFO wave selected, and where it is applied as a modulator. There are seven possible waveshapes for the LFO.

- **NOISE — Noise Generator**

The Noise generator creates a randomly changing level. It is useful for modulating, among other things, the pitch of a voice (Pitch Mods page). Applied to pitch with large modulation amounts, it tends to create strange “computer sound” effects. Small modulation amounts (around +02 to +04) can create a subtle random movement in the sound, which can impart a more natural quality.

On the second sub-page of the LFO page (press **LFO** twice) there is a parameter labeled **NOISE-RATE=##**, which adjusts the rate at which the level of this modulator will change.

- **ENV-1, ENV-2, (ENV-3)**

The TS-12 has three complex *Envelopes*. Envelopes are used to create changes, over time, in pitch, brightness, volume, etc.

- > ENV-1 is permanently routed to the pitch of the voice, though it can be assigned as a modulator elsewhere if you wish.
- > ENV-2 is permanently routed to the filter cutoff frequency. It also can be assigned as a modulator elsewhere.
- > ENV-3 is a special case. ENV 3 *always* controls the volume of the voice, and cannot be selected as a modulator anywhere else.

- **MIXER — Mod Mixer/Shaper**

The Mod Mixer/Shaper is a powerful feature which allows you to assign two modulation sources to one input, and to scale and shape the response of one of those modulators. The controls on the Mod Mixer page are used to determine what will happen when MIXER is chosen as a modulator.

- **WL + PR — Wheel + Pressure**

This is one of two “combination” modulators. When selected, both the mod wheel and pressure will affect the level which is being modulated. This can be good for modulating LFO depth when using the LFO for vibrato. That way the player can use either to get vibrato.

- **PR + VL — Pressure + Velocity**

Another combination modulator. When this modulator is selected, both pressure and velocity will affect the level which is being modulated.

- **WHEEL — Modulation Wheel**

The *Mod Wheel* to the left of the keyboard is assignable wherever a modulator is selected. To use the mod wheel for vibrato (one common application) WHEEL must be assigned to modulate the LFO, and the LFO Amount set to some number other than zero on the Pitch Mods Page. The mod wheel's effect is positive-going only, from 0 (wheel towards you) to +99 (wheel away from you). Negative modulation amounts will reverse the effect.

- **PITCH — Pitch Bend Wheel**

This assigns the Pitch Wheel, located to the left of the mod wheel, as a modulator. It allows you to have the Pitch Wheel, in addition to bending the pitch of a note (its normal function), also affect some other level. Applied to the filter cutoff frequency, for example, this would cause notes to become brighter as you bend them upwards, and more muted as you bend them down (or the opposite with negative modulation amounts).

- **PEDAL — Voltage Control Foot Pedal**

This selects the *CVP-1 Foot Pedal*, which can be plugged into the Pedal•CV jack on the TS-12 rear panel, as a modulator. Its effect will be the same as that of the mod wheel. It can be applied wherever a Modulator is selected.

Note that the Foot Pedal will only act as a modulator when the Pedal Function Select parameter is set to PEDAL=MOD on the System Page. When that parameter is set to PEDAL=VOL the Foot Pedal will act as a volume pedal, not as a modulator (though this has no effect on incoming MIDI Foot Pedal data). See *Section 2 — System Page Parameters* for more details.

- **TIMBR — Timbre Control**

This is a special modulator, which is intended as an “extra” real-time performance controller. TIMBR can be assigned like any other modulator wherever a modulation source is selected. It is controlled from the Timbre page in the Track Parameters section.

The Timbre parameter also controls the *relative* volume modulation amounts for each of the six program voices (assigned on the TIMBRE sub-page found on the Program Control Page). This allows you to determine how much louder or softer each voice will become as the Timbre modulation controller is increased or decreased.

Whenever you are playing a sound or preset, you can press the **Brightness/Timbre** button twice to get to the Timbre sub-page, and use the **Data Entry Slider** to change the level of the Timbre modulator. Note that because it can be assigned to modulate any mod destination within a voice or effect, the Timbre control will not always necessarily adjust the tone color (which is what we normally associate with the word *timbre*) of a given sound, depending on what the programmer has chosen to do with it. As a rule, however, programmers are encouraged to make sure that Timbre always does *something* interesting to the sound.

- **XCTRL — External Controller**

Like the TIMBR modulator, the External Controller (XCTRL) modulator can be assigned to modulate any voice or effect modulation destination. Whenever you are playing a sound or preset, you can press the **Brightness/Timbre** button three times to get to the XCTRL sub-page, and use the **Data Entry Slider** to change the level of the XCTRL modulator.

In addition to using the Track XCTRL parameter, an external controller such as a Breath Controller, Data Entry Slider, etc., that is received via MIDI from another synthesizer or MIDI controller, will modulate any voice or effect parameter that has XCTRL assigned as a modulator. On the MIDI Control Page, you select the MIDI Controller number of the external controller that will be recognized by the TS-12.

You don't have to be playing the TS-12 from an external instrument for this to work. For example, if you have a keyboard with a Breath Controller:

- 1) Connect its MIDI Out to the TS-12 MIDI In
- 2) Make sure both instruments have controllers enabled (MIDI Control page)
- 3) Select Breath Controller as the external controller that will be received by the TS-12 (XCTRL=02, also on the MIDI Control Page)
- 4) assign XCTRL as a Modulator for LFO level, Filter Cutoff frequency, or some other manual level within a voice
- 5) play the sound from the TS-12 keyboard, while blowing into the Breath Controller connected to the sending instrument. The modulation will have the same effect as if you were playing from the sending instrument.

- **PRESS — Pressure (After-touch)**

Pressure, also called after-touch, is a modulator which varies a manual level within a voice depending on how hard you press down on a key or keys. After you have struck a key, and while the note is sustaining, continuing to press down harder on the key brings in pressure. The TS-12 keyboard generates pressure, and by using this modulator you can add a tremendous amount of expression to your sounds without ever taking your hands off the keyboard.

Pressure comes in two varieties — *Poly-Key™* pressure (or Polyphonic pressure), which affects each note individually, and *Channel* pressure (or Mono pressure) which affects all notes that are playing when you exert pressure on any key. Only channel pressure can be generated on the TS-12's keyboard, but both types are received via incoming MIDI.

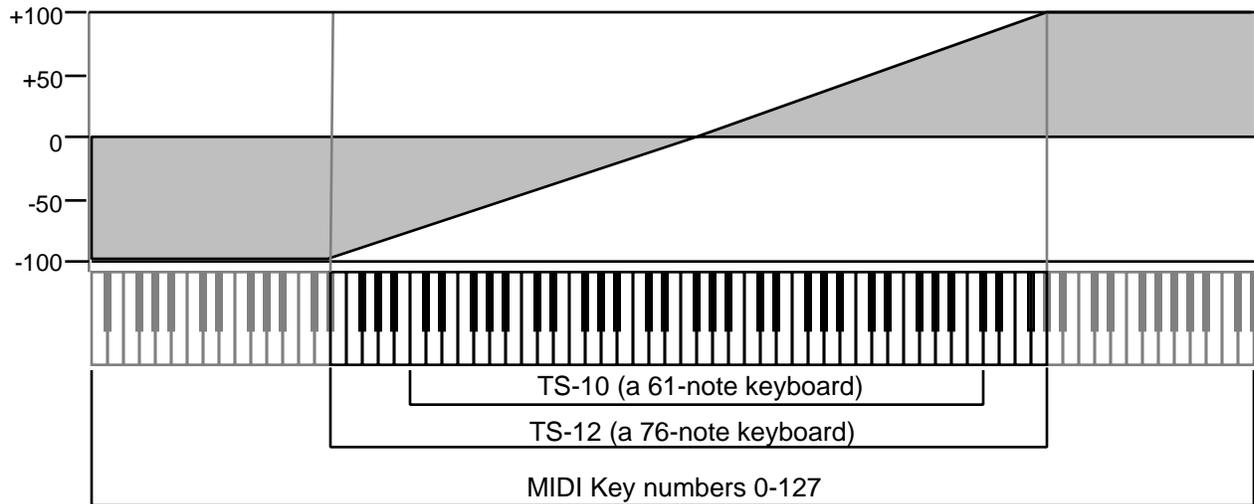
There is a Pressure parameter on a sub-page of the Performance Options page (press **Performance Options** twice) which determines if pressure will be used by the program. This control can also be set to NONE, in which case the program will not respond to pressure internally, nor will it send or receive it via MIDI (see *Section 5 — Preset/Track Parameters* for more details).

Note that not all sounds are necessarily programmed to respond to pressure. If pressure seems to have no effect when you play certain sounds, it is likely that pressure is not assigned as a modulator anywhere within the sound.

The effect of pressure as a modulator is positive-going only, though assigning a negative modulation depth will cause increased pressure to reduce manual levels.

- **KEYBD — Keyboard Tracking**

This uses the position of a note on the keyboard as a modulator. The scaling effect of this Modulator is based on a 76-note keyboard:



As the above illustration shows, the effect of KEYBD as a modulator goes negative as well as positive. The effect of KEYBD is to reduce the Level on notes below the break point (F4+), and increase levels above that point. Negative Modulation depths will do the opposite.

- **VELOC — Velocity**

Velocity means how hard you strike a key. Selecting VELOC as a Modulator allows you to modulate any manual level with velocity. Velocity as a modulation source only goes positive (though assigning a negative modulation amount will make the net result be to reduce the level with increased velocity).

- ***OFF***

Modulation is disabled.

Wave Page

Each TS-12 voice will play one of the 254 waves in its memory. These waves are the “raw material” from which TS-12 programs are crafted. On the Wave page you can choose which wave the currently selected voice will play, and modify the various playback parameters of the wave.

Wave Class

The TS-12 waves are divided into 16 categories, or *Wave Classes*:

KEYBOARD	PERCUSSION
STRING-SOUND	TUNED-PERCUS
BRASS+HORNS	SOUND-EFFECT
WIND+REEDS	WAVEFORM
VOCAL-SOUND	INHARMONIC
BASS-SOUND	TRANSWAVE
DRUM-SOUND	WAVE-LIST
CYMBALS	DRUM-MAP

The first eleven wave classes contain samples of real acoustic and electronic sounds, which can be used as the basis for a wide variety of realistic musical sounds. Where necessary, these waves have been *multi-sampled* (sampled at many points through the range of the instrument) for maximum accuracy.

The next three wave classes contain a variety of sampled and algorithmically generated waves that are more “synthesizer” oriented:

- **WAVEFORM** - A waveform is a single cycle of a sound repeated over and over. The TS-12 contains both sampled and synthetic waveforms. Waveforms such as Sawtooth and Square can be used to reproduce a wide array of analog synth sounds.
- **INHARMONIC** - Inharmonic loops are similar to waveforms except that they contain many cycles of the sound and can therefore contain *inharmonics* — frequencies which are not exact multiples of the fundamental frequency.
- **TRANSWAVE** - is a special class of waves. Each Transwave consists of many single-cycle waveforms, each with a different harmonic spectrum. The playback parameters allow you to start the wave playing at any one of these waveforms and move through the wavetable, continually varying the timbre of the sound, using any of the 15 modulators.

The last two wave classes are unique in that they are only available when OPTION=WAVE-LIST or DRUM-MAP on the Program Control page:

- **WAVE-LIST** - up to sixteen user-definable waveforms are linked together to create a single wave-list. Any of the internal waveforms can be used, and can be played in any order, forward or backward, to create effects and “jam-loops.”
- **DRUM-MAP** - Up to 61 different waves can be assigned to each key of the keyboard to create “custom” drum-maps. Individual keys can be assigned their own volume levels, panning, pitch, and voice parameter template.

Complete TS-12 ROM Wave Catalog

The wave class is shown in bold at the top of each ROM Wave group.

<p>KEYBOARD: GND-PIANO PNO-THUD EL-PIANO1 EL-PIANO2 EL-PIANO3 EL-PIANO4 EL-PIANO5 WURLIE-LO WURLIE-HI ROCK-ORGN JAZZ-ORGN ROTARYORG ORGAN-1 ORGAN-1 PIPE-ORGN REED-ORGN CELESTE HARPSICRD SYNTH-PAD SYNTH-ANA SYNTH-VOX</p>	<p>WIND+REEDS: SOPRN-SAX SOPRN-SAX2 ALTO-SAX TENOR-SAX CLARINET OBOE OBOE-VAR FLUTE FOLKFLUTE PANFLUTE CHIFFLUTE SHAKU HARMONICA ACCORDION</p>	<p>DRUM-SOUND (continued): SIDESTK-2 BRUSH-SCR BRUSH-TAP BRUSH-OPN BRUSH-HIT DANCE-SNR HIPHOP-SN SYNSNAR-1 SYNSNAR-2 SYNSNAR-3 SYN-STICK DRY-TOM ROOM-TOM1 ROOM-TOM2 BRUSH-TOM SYN-DRUM1 SYN-DRUM2 SYN-DRUM3</p>	<p>TUNED-PERCUS: VIBRAPHON MARIMBA XYLOPHONE GLOCKEN TYMPANI TUNED-TOM TUNED-LOG STEEL-DRM KALIMBA GAM-BELL DOORBELL WHISTLE DANCE-HIT ORCH-HIT</p>	<p>INHARMONIC: TUBULAR BIG-BELL CRYSTAL SYNTHBELL NOISE AIR-LOOP SPINNER-1 SPINNER-2 TEXTURE-1 TEXTURE-2 METL-LOOP</p>
<p>STRING-SOUND: NYLON-GTR STEEL-GTR GTR-VAR FRETNOISE NYLON-HRM ELEC-GTR1 ELEC-GTR2 ELEC-GTR3 DIST-GTR MUTE-GTR GTR-HARM HARP OCT-HARP STRINGS PIZZ-SECT SOLOVIOLN SOLOCELLO SOLO-PIZZ TECHSTRNG GOTO BIWA SHAMISEN SITAR BANJO DULCIMER</p>	<p>VOCAL-SOUND: CHOIR VOCAL-OOH VOCAL-AAH VOCAL-SYN</p>	<p>CYMBALS: CLO-HAT-1 CLO-HAT-2 OPN-HAT-1 OPN-HAT-2 PEDAL-HAT CRASH-CYM CHINA-CYM RIDE-CYM RIDE-BELL SYN-HAT-CL SYN-HAT-OP</p>	<p>SOUND-EFFECT: BIRD-SONG APPLAUSE TELEPHONE AN-OLD-45 MACHINE CLICKER-1 CLICKER-2 BELL-LOOP</p>	<p>TRANSWAVE: BELL-XWV1 BELL-XWV2 RESONANCE XWAVE-EE XWAVE-AY XWAVE-AA XWAVE-OH XWAVE-Z</p>
<p>BRASS+HORNS: TRUMPET FLUGELHRN MUTE-TRMP PICO-TRMP TROMBONE TUBA TRUMP-SEC FRHRN-SEC TBONE-SEC</p>	<p>BASS-SOUND: EL-BASS-1 EL-BASS-2 EL-BASS-3 SLAP-BASS PICK-BASS MUTE-BASS BASS-TAP FRETLESS BS-HARMS AC-BASS BASS-THUD FM-BASS SYNBASS-1 SYNBASS-2 SYNBASS-3 ANABASS-1 ANABASS-2 ANABASS-3 ANABASS-4</p>	<p>PERCUSSION: CONGA-MT CONGA-SLP CONGA-HI CONGA-LO TIMBALI BONGO TABLA-SLP TABLA-HI TABLA-LO TAIKO SHAKER CABASA MARACAS HI-BLOCK LO-BLOCK CLAVE CASTANETS GUIRO CUICA VIBRASLAP COWBELL AGOGO-BEL TAMBORINE TAMB-LOOP TRIANGLE METALPIPE</p>	<p>WAVEFORM: SINE-WAVE SQUARE-WV SAW-WAVE1 SAW-WAVE2 TRI-WAVE ORG-WAVE1 ORG-WAVE2 ORG-WAVE3 ORG-WAVE4 ORG-WAVE5 ORG-WAVE6 CH-ORG-WV BEL-WAVE1 BEL-WAVE2 BEL-WAVE3 BEL-WAVE4 BEL-WAVE5 BEL-WAVE6 BEL-WAVE7 DBL-REED SNGL-REED CLAV-WAVE PAD-WAVE1 PAD-WAVE2 PAD-WAVE3 PAD-WAVE4 PAD-WAVE5 PAD-WAVE6 5THS-WAVE VOCAL-WV DIGI-WAVE ANDROMEDA SYNKEY-WV ANA-WAVE1</p>	

	JAZZSNARE SNARE-ROL RIMSHOT-1 RIMSHOT-2 SIDESTK-1	WINDCHIME WNDCHIME2 FNGR-SNAP SYN-CLAPS SYN-KISS RATTLE	ANA-WAVE2 ANA-WAVE3 ANA-WAVE4 METL-WAVE	
--	---	--	--	--

Using the Copy Functions

The Copy page provides programming utility functions for:

- copying entire pages of parameter data at once while programming voices
- copying complete voices, effects, or programs
- changing the system pitch-table

About the Copy Functions

When programming synthesizers, it is often desirable to be able to make changes to some component of a sound and then to transfer the newly modified component to another part of the same voice or program, or even to use it in a different program. The Copy page of the TS-12 provides several useful functions which facilitate copying components from one place to another. The components which can be copied may be all of the parameters on a page or in a voice, or even an entire program. The copy function can be used to move programs from one location to another, using a procedure described later in this section.

Press the **Copy** button will display the Copy page menu. Pressing **Copy** again will return you to the last parameter page that was selected.

```
COPY      <COPY CONTEXT>  PARAMETERS
          <SPECIAL>     RECALL    MAKE COPY
```

The top line of the display indicates the currently selected *copy context*. The copy context is determined by the type of page that was selected just before you pressed **Copy** to enter the Copy page. The copy context determines which parameters will be affected by the functions on the page.

How to Set the Copy Context:

- Press **Wave** to display the Wave page.
- Press **Copy**. The copy context will show WAVE PAGE PARAMETERS.
- Press **Copy** again. You will be returned to the Wave page.

There is a well-defined group of copy contexts that are available for your use. The copy context is set whenever you select pages from within this group. The following table shows the copy context that is automatically set whenever particular pages are displayed.

Prior page...	Copy context	What gets copied...
LFO	ALL LFO	all LFO page parameters
ENV1, 2, 3	ENVELOPE-#	all parameters for one envelope
Pitch	PITCH PAGE	all Pitch page parameters
Pitch Mods	PITCH MOD	all Pitch Mods page parameters
Filters 1 or 2	FILTER-#	all parameters for a single filter
Output	ALL OUTPUT	all Output page parameters
Wave	WAVE PAGE	all Wave page parameters
Mod Mixer	MOD MIXER	all Mixer/Shaper page parameters
Program Control	PROGRAM	all parameters for selected program
Program Effects	EFFECTS	all Effects page parameters
Select Voice	ALL VOICE	all parameters for selected voice
Pitch-Table Editor	PITCHTABLE	one complete pitch-table (voices 5/6)
Wave-List Editor	WAVE-LIST	one complete wave-list (voices 5/6)
Drum-Map Editor	DRUM-MAP	one complete drum-map (voices 5/6)
Sounds/Program Bank	PROGRAM	all parameters for selected program

Note: In order to use the copy functions successfully, it is important to understand how to control the copy context, and what is being copied.

The copy buffer is an invisible portion of memory used to hold the most recently copied parameters until they are recalled.

The contents of the copy buffer are completely independent of the compare buffer used in editing programs. You can make copies into the copy buffer without affecting the data in the compare buffer. Recalling data from the copy buffer always changes only the compare buffer. The copy buffer can contain anything from a single page of parameter values up to an entire program which includes six voices and an effect. The copy buffer is *context-sensitive*, meaning that your options are controlled by your previous actions.

The bottom line of the display shows the available operations which can be performed on the page.

MAKE COPY

Based on the current copy context, this command will copy a set of parameters into the copy buffer. The copy buffer is a separate buffer into which the copy utility will copy data without affecting the current edit program in the compare buffer. Remember that MAKE COPY has no effect on the compare buffer or the selected program or voice.

RECALL

This command will copy parameters back from the copy buffer into the compare buffer where the edit program resides, again according to the copy context. Pressing the soft button below RECALL causes the indicated data set to be copied, and the display returns to the Copy page.

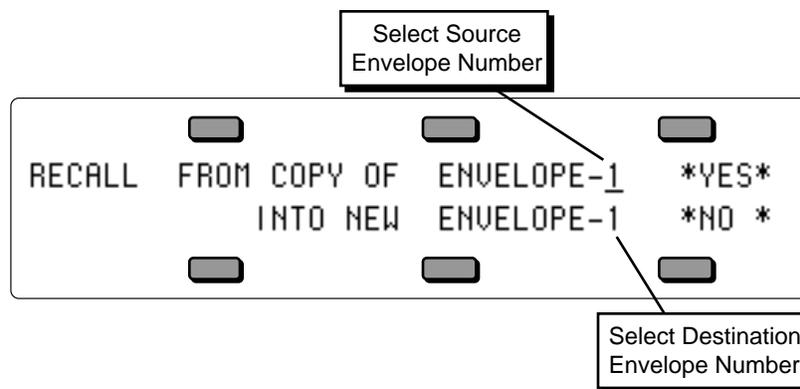
The RECALL function always copies data into the compare buffer. If the compare buffer is selected (i.e. the **Compare** LED is on) at the time you perform a recall, then the data is added to the edited program in the compare buffer. If the compare buffer is not selected then the compare

buffer is loaded with the currently selected primary program before the recall is completed. The compare buffer is always selected after a recall.

If Group Edit is active when pages of voice parameters are recalled, then the recall will affect all of the voices in the group. The data being recalled will be written into all of the grouped voices in the compare buffer at the same time. For example, you could make a copy of an envelope page from one voice and then recall it into a group of voices in one step. Group Edit has no effect when recalling effects, complete voices, pitch tables, or complete programs.

Special Recall Functions

There are several exceptions to the normal pattern of operation in the RECALL function. The first exceptions occur with the Envelope and Filter contexts. When the copy context is set to any of the Filter or Envelope settings, pressing RECALL will display an additional page which allows you to select the source and destination pages for the parameter transfer. This allows you to copy information between different envelopes and filters.



The sample screen shown above illustrates the RECALL sub-page for the ENVELOPE context. The Source Envelope number controls which envelope in the copy buffer will be used by the recall, and the Destination Envelope number determines which envelope in the compare buffer will be replaced with the new data being recalled. The default settings are always the same number for source and destination. If you want to copy across from one envelope to another, you must set the source and destination envelope numbers accordingly. The RECALL sub-page for the FILTER context is similar in appearance and function.

Remember that the copy buffer always contains copies of each of the three envelopes and two filters, regardless of whether you last used an envelope, filter, voice, or program copy function.

Another exception occurs in the PROGRAM context. Pressing RECALL from this context will take you directly to the Write page. The compare buffer is loaded with the same information as the copy buffer whenever you recall an entire program, and you are ready to save the program in a new location.

The system will alert you if you try to recall into a context different than the last copy action that was performed. This prevents you from mistakenly recalling a fragmented voice, program or pitch-table.

Special Copy Operations

There are also some special command options that appear in the display (above the lower left soft button) for certain copy contexts.

DEFAULT

There are some copy contexts which provide the option of recalling default parameter settings automatically. When this option is available, the DEFAULT command appears in the lower left part of the display.

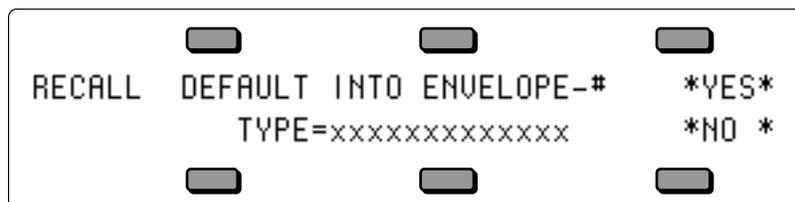
- For the ALL VOICE parameter context:



The DEFAULT command will make a copy of the default voice into the copy buffer and then automatically recall it into the currently selected voice in the compare buffer, as if you had performed the steps yourself. This allows you to easily put the voice into a standard configuration, which is often useful when creating new programs.

- For the ENVELOPE-1, -2, and -3 parameter contexts:

The DEFAULT command also appears with the ENVELOPE-# context. Pressing the soft button below the command displays a sub-page which will allow you to select from a group of standard preset envelope types which can be recalled into the current envelope. This is particularly useful when setting up typical envelopes as starting points when you are creating new voices.



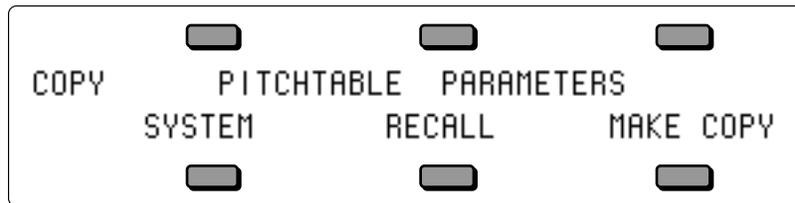
The available standard preset envelope types are:

FULL VEL RANGE	PERCUSSION 1	VIBRATO LFO
FULL ON	PERCUSSION 2	DETUNE LFO
RAMP DOWN	TIGHT PERC	REPEAT TRIANG
RAMP UP	TOM-TOM DECAY	REPEAT RAMP
RAMP UP+DOWN	HI-HAT DECAY	TRANSIENT
PIANO DECAY	LONG CYMBAL	SHORT BLIP
GUITAR DECAY	MED CYMBAL	AMP BLIP
BASS DECAY	SHORT CYMBAL	WIND PITCH
XPRSV STRINGS	BRASS FILTER	PITCH DOWN 1
FAST ATCK PAD	SFORZANDO	PITCH DOWN 2
SLOW ATCK PAD	SLOW REPEAT	ALL ZEROS
SLOW ATCK/REL	SLOW LFO	

Select the default envelope type using the **Data Entry Slider** or the **Up/Down Arrows** and press ***YES*** if you wish to install the selected envelope type into the envelope number shown on the upper line of the display. Press ***NO*** to return to the Copy page without performing any action.

SYSTEM

For the PITCHTABLE parameter context only:



When entered from the Edit Pitch-table pages, the Copy page shows the SYSTEM command on the lower left part of the display. This command will copy the pitch-table directly from the currently program, or from the compare buffer if the Compare LED is on, into the system pitch-table. It is not necessary to use the MAKE COPY command in this case. Using this command will automatically set the SYSTEM PITCH-TABLE parameter on the System page to CUSTOM, thereby selecting the newly installed pitch-table for use as the System pitch-table.

Some Useful Applications of the Copy Functions**Copying an effect from one program to another**

- Press **Sounds** and select the program whose effect you wish to copy.
- Press **Program Effects** in the Programming section to display the Program Effect page for this program.
- Press **Copy**. The copy context will show EFFECTS PARAMETERS.
- Press the soft button below the MAKE COPY option to copy the Effect page parameters into the copy buffer.
- Select the program into which you wish to copy the effect. If the sound you are working on is in the compare buffer, make sure that the Compare LED is on.
- Press **Program Effects** in the Programming section to redisplay the Program Effect page.
- Press **Copy**. You will be returned to the Copy page with the EFFECTS context.
- Press the soft button below the RECALL option to recall the effect from the copy buffer.
- Press **Copy** again. You will be returned to the Effect page. Note that the effect that you previously copied has now replaced the old effect. Remember to write the program if you wish to keep the change.
- You can use the same process to recall an effect into a sequence, song or preset.

Copying all parameters from one voice to another

When the Copy page is entered from the Select Voice page, the copy context is set to ALL VOICE PARAMETERS. In this context, the values of all voice parameters for the currently selected voice are transferred to or from the copy buffer. Using this method, you can easily copy voices within a program or from one program to another.

- Press **Select Voice** to display the Select Voice page and to set the copy context. Make sure that the voice which you wish to copy is selected.
- Press **Copy**. The copy context will show ALL VOICE PARAMETERS.
- Press the soft button below the MAKE COPY option to copy the voice into the copy buffer.
- Press **Copy** again. You will be returned to the Select Voice page.
- Select the voice you wish to replace with the voice you just copied.
- Press **Copy** again. You will be returned to the Copy page.
- Press the soft button below the RECALL option to recall the voice from the copy buffer.
- Press **Copy** again. You will be returned to the Select Voice page. Note that the voice you previously copied has now replaced the old voice.

Copying a complete program to a new location

It is easy to copy programs from one location to another using the copy and recall functions. Simply follow this procedure:

- Press **Sounds** and select the program that you wish to copy. This will automatically set the copy context to PROGRAM PARAMETERS.
- Press **Copy** to display the Copy page.
- Press the soft button below the MAKE COPY option to copy the program into the copy buffer. The program will be copied into the copy buffer, and the Copy page will be redisplayed.
- Press the soft button below the RECALL option to recall the program from the copy buffer into the compare buffer. The Write page will be displayed automatically.
- Using the normal techniques for writing programs, select the destination in which you wish to locate the copy (refer to the section describing the Write page if you are unsure how to proceed).

Making a copy of the compare buffer

If you wish to make a copy of the complete compare buffer before making some experimental edits that you are unsure of, then use the following procedure to make a backup copy of the current compare or edit buffer:

- Set the copy context to the Program context by pressing **Program Control** or **Sounds**.
- Make sure that the **Compare LED** is on, and that you are hearing the edit program of which you wish to make a copy (press **Compare** if not).
- Press **Copy** and make sure that the copy context is PROGRAM PARAMETERS.
- Press the soft button below the MAKE COPY option to copy the compare buffer into the copy buffer.

Collecting parts from several sources into the copy buffer

While you can only make a single copy of an entire voice or program at one time, it is possible to make consecutive copies of multiple pages of parameters before recalling the data you have copied. These pages can even be taken from different voices or different programs.

For example, using the normal MAKE COPY process, you can make copies of one or more envelope pages, followed by an LFO page and a wave page. A single copy of *each* of these pages is saved into the copy buffer. You can then start recalling the pages you want into the compare buffer using the normal RECALL procedure described above. The data you copied will remain intact until you copy a complete voice or program, which will replace the contents of the copy buffer.

About Pitch-Tables

Alternate pitch-tables enable you to chart new musical territories as well as explore ancient and ethnic tunings. In Western music, equal temperament has been the dominant tuning for the last one hundred and fifty years, and is really a musical compromise. In equal temperament, all intervals are equally out of tune. However, this compromise is what allows our music to remain relatively in tune as we modulate from one key to another.

Equal temperament evolved out of other systems of tuning — such as just intonation — where intervals in a scale are tuned perfectly. The difficulty with perfectly-tuned scales is that you can't modulate keys as universally as with equal temperament. Nonetheless, computer technology — keep in mind your TS-12 is in fact a computer — has made it easy to create and employ alternate pitch-tables.

Imagine starting a piece in equal temperament, modulating to Pythagorean, then Werckmeister, then 19 tone, and back to equal temperament, simply by changing Programs. Sound interesting? Then the following section can help you on your way.

You select the pitch-table for each voice on the Pitch Mods page. The options are:

- **SYSTEM** — This is the “global” or keyboard-wide pitch-table. As it comes out of the box, the TS-12's System pitch-table defaults to 12-tone equal-temperament tuning (standard tuning). However, you can copy a custom pitch-table into the system for use by all your programs. The parameter for changing the system pitch-table is on the System page. More on this feature a bit later.
- **ALL-C4** — No pitch tracking — all notes tuned to C4 (middle C).
- **CUSTOM** — each program in the TS-12 can have its own “user-definable” (that is, you create it) pitch-table. When you create a custom pitch-table, wave-list, or drum-map, the TS-12 will remove voices 5 and 6 from the program to create space for the pitch-table, wave-list, or drum-map. Bear this in mind — it could adversely affect the program if voices 5 or 6 are important parts of the sound.

How to Create a Custom Pitch-Table

- Select a Program into which you want to write a custom pitch-table.
- Press **Program Control**. The display shows the Program Control page:

```

      [ ]      [ ]      [ ]
PROGRAM TYPE=KEYBOARD  OPTION=*-NONE-*
      PRESS=KEY  PATCH=LIVE  RESTRIKE=35
      [ ]      [ ]      [ ]

```

- Make sure OPTION=*-NONE-* is underlined.
- Press the **Up Arrow** button. The display reads:

```

      [ ]      [ ]      [ ]
REPLACE VOICES 5+6 WITH  *EXIT*
      PITCH-TABLE  WAVE-LIST  DRUM-MAP
      [ ]      [ ]      [ ]

```

As mentioned earlier, whenever you create a custom pitch-table, the TS-12 will delete voices 5 and 6, and use the memory normally occupied by those parameters to store the pitch-table.

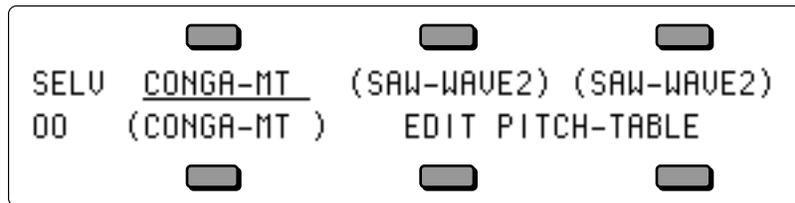
- Press the soft button underneath PITCH-TABLE to REPLACE VOICES 5+6. This takes you to the Select Voice page, which now shows the words EDIT PITCH-TABLE where voices 5 and 6 once were.

We have just created a custom pitch-table with variable pitch values for each key. Keep in mind that the custom pitch-table will sound the same as the System pitch-table until you *edit* it. We will do this a bit later.

When you create a pitch-table and start editing it, you are in the edit buffer (the Compare light is on), and all edits will affect the data in the edit buffer, and not the program's memory. If you use the copy function while the compare light is on, the TS-12 will copy the data in the edit buffer, and not the program's memory.

First, we need to select which of the four voices will use the custom pitch-table:

- Double-click its soft button to solo the first voice on the Select Voice page:



- Press **Pitch Mods**. This takes us to the Pitch Mods page.
- Select the pitch-table parameter in the display and set it to PITCHTBL=CUSTOM.

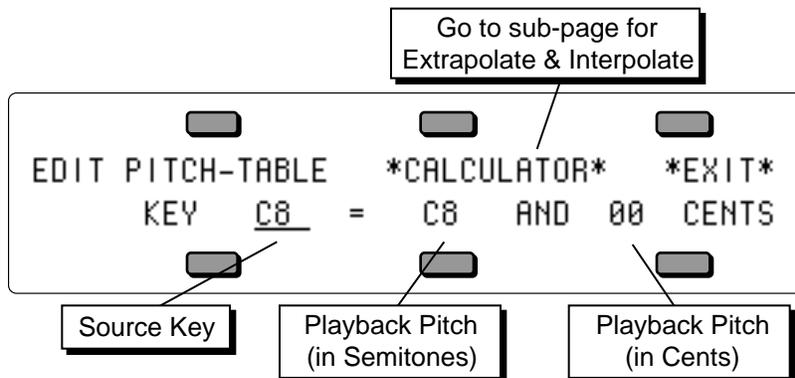
Voice #1 is now set to play the custom pitch-table. This will enable you to hear any edits you make to the custom pitch-table.

Each voice in a program can be assigned to play either the System, no-pitch, or custom pitch-table. For example, Voice #1 can play the System pitch-table; Voice #2, a custom pitch-table; voices 3 and 4, No-pitch (C notes across the keyboard).

Editing a Custom Pitch-Table

As mentioned earlier, until you *edit* the custom pitch-table — change the default note assignments — the custom pitch-table will sound the same as the system pitch-table. To edit a custom pitch-table:

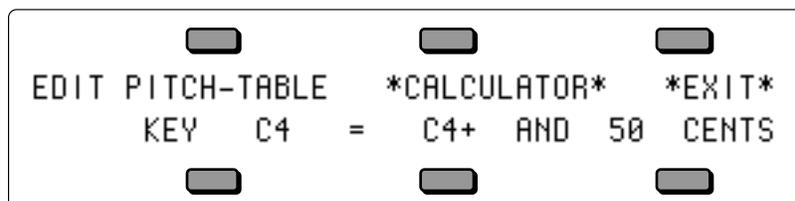
- On the Select Voice page, press either of the soft buttons beneath EDIT PITCH-TABLE. This takes us to the EDIT PITCH-TABLE page.



For every source key on the lower left, you can see and edit the pitch of that key.

The source key can be thought of as the physical location of the key on the keyboard. The playback pitch can be the same as the source key — as shown in the display — or it can be any pitch from A0 to C8. The range of the fine tuning is 00 to 99 cents. This enables you to create micro-tunings and other alternate tunings. First, let's get a feel for the relationship between the source key and the playback pitch.

- Make sure the Source Key is underlined (by pressing the soft button beneath it).
- Play C4 (middle C) on the keyboard, or use the data entry controls to select C4 as the source key.
- Underline the playback pitch, in this case, C4.
- Use the **Up Arrow** button and change C4 (playback pitch) to C4+.
- Underline 00 CENTS. Use the data entry controls to change the value to 50 CENTS. The display reads:



C4 now plays back at C4+ and 50 Cents, one and one half semitones higher than normal. Try selecting other source keys, and then changing their playback pitches to any values you like. This is how we edit the custom pitch-table.

- Press *EXIT* to return to the Select Voice page.

Removing a Custom Pitch-Table

If a program contains a custom pitch-table and you wish to remove it (thus restoring voices 5 and 6) you can do so from the Program Control page:

To remove a custom pitch-table:

- Press **Program Control**.
- Underline OPTIONS=PITCHTBL.
- Press the **Down Arrow** button.
- The TS-12 will ask ERASE CURRENT PITCH-TABLE?
- Press *YES*. You are returned to the Select Voice page, the custom pitch-table is gone, and voices 5 and 6 are reset to the default voice.

You are now free to create a new custom pitch-table in your current program.

Now that you understand the relationship between the source key, playback pitch, and fine tuning in a custom pitch-table, let's start over. This time we'll work with an ancient tuning system, called Pythagorean. Then, we'll work with the TS-12 built-in pitch-table calculator, and two new procedures: Extrapolation and Interpolation.

Creating and Extrapolating a Custom Pitch-Table

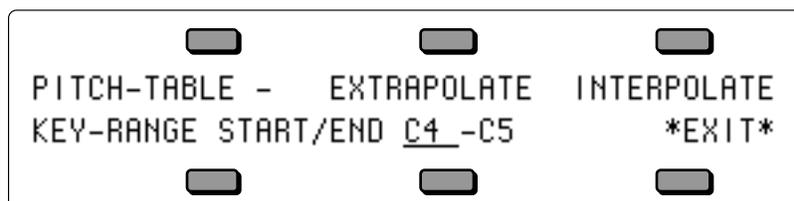
The EXTRAPOLATE command takes the pitch-table relationships from within a key range and duplicates those relationships outside that range.

- If you have a custom pitch-table from the previous exercise, remove as shown above.
- Select a program into which you want to write a custom pitch-table.
- Press **Program Control**. This takes us to the Program Control page.
- Make sure OPTION=*-NONE-* is underlined.
- Press the **Up Arrow** button.
- Press PITCH-TABLE to REMOVE VOICES 5+6. This takes us to the Select Voice page.
- Select a voice into which you want to write a custom pitch-table.
- Press **Pitch Mods**.
- Select PITCHTBL=CUSTOM.
- Press **Select Voice** to return to the Select Voice page.
- Press either of the soft buttons beneath EDIT PITCH-TABLE. This takes us to the Pitch-Table Editor page.
- The display shows the source key and playback pitch as described earlier.
- To set up one octave of a Pythagorean scale, change the source keys, playback pitches, and cents, one note at a time, from C4 to C5 — to the following values:

Source Key	Playback Pitch	Cents
C4	C4	00
C4+	C4+	17
D4	D4	04
D4+	D4+	01
E4	E4	08
F4	E4	98
F4+	F4+	12
G4	G4	02
G4+	G4+	14
A4	A4	06
A4+	A4	98
B4	B4	10
C5	C5	00

You can manually edit your custom pitch-table across the remaining octaves of the keyboard. Or you can use the Calculator in the TS-12 to do this for you.

- Press the soft button above *CALCULATOR*. The display reads something like this:



The KEY-RANGE defines the area of the keyboard that the TS-12 will use as a reference by which to make its calculations.

To set the key-range:

- The START key (the first of the two key numbers shown) should be underlined. If not, press the soft button beneath it to select it. Now, play C4 (middle C) on the keyboard. The underline jumps to the END key.
- The END key should now be underlined. Play C5 on the keyboard. The parameter should read: KEY-RANGE START/END C4 – C5. You have defined the key range whose pitch intervals you want to duplicate over the entire keyboard.

Note that you can also set the start and end keys using the data entry controls, and press the soft button beneath them to toggle back and forth.

We began editing our pitch-table with note C4 and ended our editing with C5. This is the key-range for this particular pitch-table. Extrapolate will take the intervals between the notes in our one-octave custom pitch-table and apply them to the rest of the keyboard, resulting in a Pythagorean tuning covering the entire keyboard.

- Press EXTRAPOLATE. The display briefly reads PITCH-TABLE *CALCULATOR*, then returns with the Pythagorean temperament across the entire keyboard.

At this point you might want save this pitch-table by using the Copy function to write the program into a User RAM location as described earlier in this Section. Or, you can use the Copy function to copy the PITCHTABLE into another program, or even into the System, for use by all your programs.

Creating and Interpolating a Custom Pitch-Table

INTERPOLATE takes the interval between two notes on the keyboard and divides all the keys in between into equally-spaced fractions of that interval.

As an example, lets make the entire 5-octave keyboard of the TS-12 span just one octave in pitch from the lowest key to the highest.

- Using the procedure described earlier, create a custom pitch-table, and select PITCH-TABLE=CUSTOM on the Pitch Mods page.
- On the Select Voice page, press the soft button for EDIT PITCH-TABLE.
- Set KEY C2 = C3 AND 00 CENTS. Next, set KEY C7 = C4 AND 00 CENTS.

We've just established an interval of an octave between C2 and C7.

- Press *CALCULATOR*
- Set the key range to KEY-RANGE START/END C2 C7.
- Press INTERPOLATE.

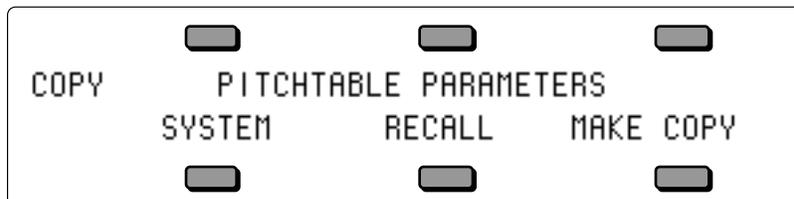
The TS-12 has just interpolated the octave (C3 to C4) and divided it equally across the 61 note keyboard, so we now have a 60 step octave.

Warning:

You must save the program containing your custom pitch-table, copy the custom pitch-table into another program, or into the system, or you will lose it as soon as you edit another sound.

Using the Copy page with Pitch-Tables

- Select a program which contains a custom pitch-table.
- Press **Select Voice**.
- Press either soft button beneath EDIT PITCH-TABLE.
- Press the **Copy** button. The display reads:



Pressing **Copy** from the Pitch-Table Editor page will display the COPY PITCHTABLE PARAMETERS page with the following options:

The **MAKE COPY** option allows you to make a copy of the complete pitch-table from the currently selected program (or the Compare Buffer) into the Copy Buffer.

The **RECALL** option allows you to recall the complete pitch-table from the Copy Buffer into an edited version of the current program if 1) the current program has a pitch-table installed in it *and* 2) the Copy buffer contains a pitch-table. If you attempt to recall a Pitch-Table into a program without just previously having copied a pitch-table into the Copy buffer, the copy is not completed and an error message is displayed.

SYSTEM— As an added feature, the System pitch-table itself is user-definable. For instance, if you want to hear what other programs sound like using the custom pitch-table from a program, you can redefine the System pitch-table. Or, if your main tuning is “just intonation,” then it might be convenient for you to use this or some other alternate tuning as your System tuning.

To install an alternate tuning into the System pitch-table:

- Press the soft button beneath **SYSTEM**. The display briefly reads COPY TO SYSTEM PITCH-TABLE, and the custom pitch-table is installed into the TS-12 operating system where it is available for use by any program.
- Press the **System** button four times. The display shows:



- Note that the System PITCH-TABLE parameter has been set to **CUSTOM**. Now all programs whose voices are set to use the system pitch-table (which is most programs) will use the custom pitch-table.

To return all programs to standard equi-tempered tuning, set the System PITCH-TABLE parameter back to **NORMAL**. Switching back to **CUSTOM** will restore your custom System pitch-table. You can switch back and forth as often as you wish. You can also try installing other custom pitch-tables in the System, but the System pitch-table can only contain one custom pitch-table at a time.

Dynamic Pitch-Table Selection

The TS-12 allows you to easily switch between different system pitch-tables in performance situations. With PITCH-TABLE=U1-PROGRAMS (on the System Page), you can instantly load new CUSTOM system pitch-tables without affecting the sound you are playing by selecting programs in BankSet U1. This allows you to change the tuning while playing, and without having to actually select a different sound.

In order for this feature to work correctly, you must set the system pitch-table switch to PITCH-TABLE=U1-PROGRAMS on the System page before “selecting” a new pitch-table program. If the program you indicate contains a valid pitch-table, it will be installed into the CUSTOM System pitch-table, and you will immediately hear the new tuning. If it does not, nothing will happen. In either case there will be no visible indication of your action. The program name will not be underlined when you “select” it, which is a good indication that you are using a pitch-table from a program in BankSet U1.

You may save programs (with or without pitch-tables) onto BankSet U1 in the normal way. It is suggested that you name programs that are to be used to install pitch-tables with names that describe the pitch-table they contain. For example, naming a program PT-PYTHA-F describes it as follows: PT for pitch-table program; PYTHA for Pythagorean tuning; and F for the tone center. This naming scheme is useful in making pitch-table programs easily recognizable.

In MIDI reception modes OMNI, POLY, and MONO A, incoming MIDI program changes 0 to 59 will select pitch-tables from BankSet U1, if PITCH-TABLE=U1-PROGRAMS on the System page. For more information about the MIDI MODE parameter, see *Section 3 — MIDI Control Page Parameters*.

About Wave-Lists

Hyper-Wave™ architecture allows up to 16 waves to be defined in a list, which can be swept through, or cross-faded for timbre-shifting and Jam-Loops. Hyper-Waves are created by selecting WAVE-LIST with the OPTION parameter found on the Program Control page (replacing voices 5 and 6 in a program). Note that when using a Wave-List, your polyphony is halved. This is to allow smooth transitions with the Wave-List XFADE-TIME (crossfade time) parameter, which requires two voices playing at the same time.

Wave-Lists have their own specific parameters, and are described in the following section.

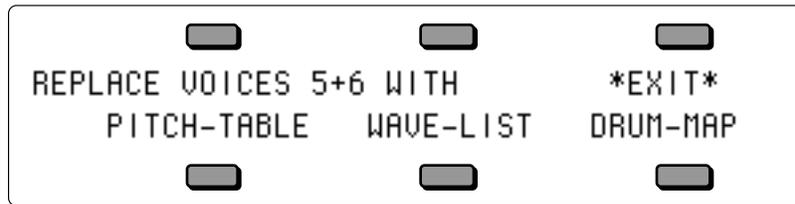
How to Create a Wave-List

- Select a program into which you want to install a custom wave-list.
- Press **Program Control**. The display shows the Program Control page:



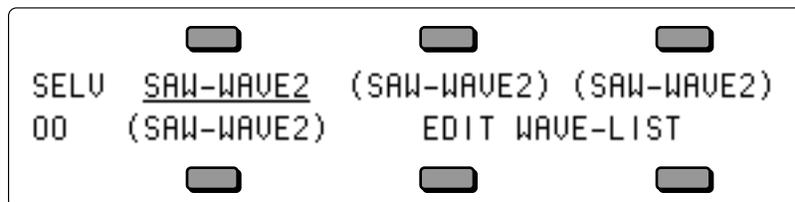
- Make sure OPTION=*-NONE-* is underlined.

- Press the **Up Arrow** button. The display reads:

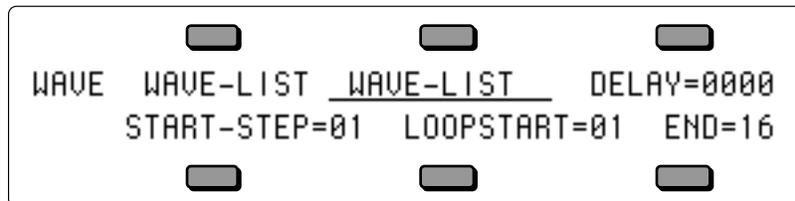


Whenever you create a wave-list, the TS-12 will delete voices 5 and 6, and use the memory normally occupied by those parameters to store the wave-list.

- Press the soft button underneath **WAVE-LIST** to replace voices 5 & 6, and create a new default wave-list in the program. Selecting **WAVE-LIST** will also display the Select Voice page with the **EDIT WAVE-LIST** option activated. Note that the Program Control page will now show **OPTION=WAVELIST** to indicate that a wave-list is active in the program. The display shows:



- Select one of the four available voices. In the example above, the first voice is selected.
- Press the **Wave** button, select the Wave Class Category, and move the **Data Entry Slider** all the way up to select **WAVE-LIST**. The display shows:

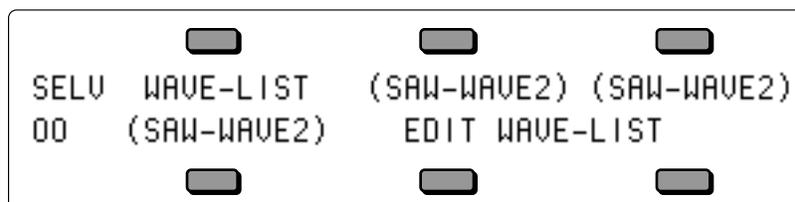


- Press the **Select Voice** button. Your edited program now contains a Wave-List and voice #1 will now play the Wave-List.

Note: Voices that play the Wave-List will use two notes of polyphony for each note played. This is necessary to allow smooth crossfades between each Step in the Wave-List.

Editing a Wave-List

When a wave-list is active within the current program, the Select Voice page looks something like this:



The wave names of the four voices are shown with their mute status indicators, but the locations where voices 5 and 6 would normally be shown are occupied by the **EDIT WAVE-LIST** command.

When the displayed wave name for a voice is WAVE-LIST, the actual individual wave name for *each step* of the wave-list is shown only on the Wave-List Editor page (accessed by selecting EDIT WAVE-LIST). If a voice's displayed wave name is anything other than WAVE-LIST, and it is active (no brackets around the wave name), then that voice will sound using the displayed wave whenever a key is pressed.

- Press either soft button beneath EDIT WAVE-LIST. This takes you to the Wave-List Editor page, where you can select any internal ROM waveform for each of the 16 different wave steps, set its start time, length, relative volume level, crossfade time, depth, pitch, transposition, detune amount, and its direction within the wave-list. For complete descriptions of the Wave-List Editor parameters, see *Section 9 — Program Parameters*.

Note: Remember to save the edited program after you have created and edited a wave-list.

Removing a Wave-List

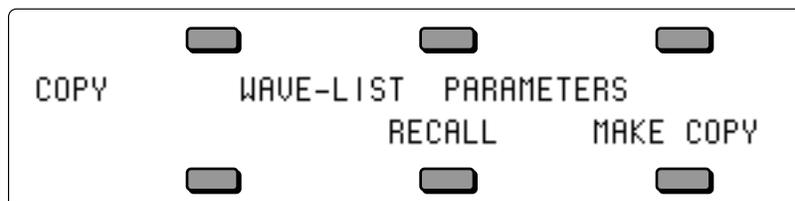
If a program contains a custom wave-list and you want to remove it (thus restoring voices 5 and 6) you can do so from the Program Control page:

To remove a custom wave-list:

- Press **Program Control** to display the Program Control page.
- Underline OPTION=WAVELIST.
- Press the **Down Arrow** button.
- The TS-12 will ask ERASE CURRENT WAVE-LIST ?
- Press *YES*. You are returned to the Select Voice page, the custom wave-list is gone, and voices 5 and 6 are reset to their default voices.

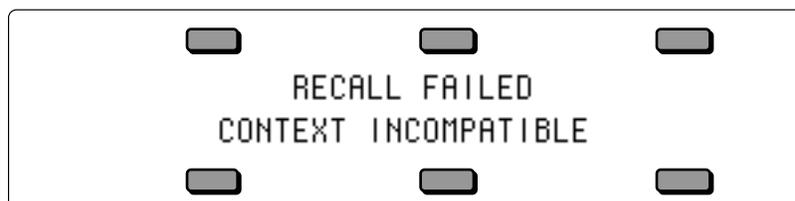
Using the Copy page with Wave-Lists

Pressing **Copy** from the Wave-List Editor page will display the Copy page with the following options:



The MAKE COPY option allows you to make a copy of the complete Wave-List from the currently selected program (or the Compare Buffer) into the Copy Buffer. Pressing the lower right soft button beneath MAKE COPY will complete the command, and will show COPY COMPLETED before returning to the Copy page.

The RECALL option allows you to recall the complete Wave-List from the Copy Buffer into an edited version of the current program if 1) the current program has a Wave-List installed in it and 2) the Copy buffer contains a Wave-List. If you attempt to recall a Wave-List into a program without just previously having copied a Wave-List into the Copy buffer, the copy is not completed and the following message is displayed:



About Drum-Maps

Drum-Maps are similar to pitch-tables in that they replace voices 5 and 6 in a program with a set of parameters which redefine the pitch of individual keys on the keyboard. Drum-Maps do not have the same tuning resolution as pitch-tables, but they add the ability to also assign different waves, volume levels, panning, and voice output assignments to individual keys across the keyboard. This feature is particularly useful for creating complex keyboard assignments for percussion applications, hence the name “Drum-Map.”

One very useful aspect of this feature is the ability to construct a TS-12 program which emulates the key mapping and sonic characteristics of an external drum machine or percussion sound module, allowing you to record and play sequencer tracks which are compatible with the maps used by any external MIDI device. You may also exercise your creativity in coming up with other uses for the remapping functions provided by this feature.

The basic function of a Drum-Map is to control how keys are assigned to voices, and to provide a certain set of parameters to control how the voice is played. When you play a key, the system looks in the drum-map for information about pitch, volume, panning, wave type, and destination voice(s) for that particular key. Based on this information, the key is sent to one or more voices to be played. The exact way that the key will sound depends both on the information in the drum-map and the parameter settings of the destination voice(s).

Drum-Maps contain information about 61 keys. This represents the range from B1 to B6 on the TS-12 (MIDI keys 35 to 95). This range was designed to comply with the General MIDI Drum-Map spec.

General MIDI Drum Map

MIDI Note #	TS-12 Note	GM Drum Sound
35	B1	Acoustic Bass Drum
36	C2	Bass Drum 1
37	C2+	Side Stick
38	D2	Acoustic Snare
39	D2+	Hand Clap
40	E2	Electric Snare
41	F2	Low Floor Tom
42	F2+	Closed Hi-Hat
43	G2	High Floor Tom
44	G2+	Pedal Hi-Hat
45	A2	Low Tom
46	A2+	Open Hi-Hat
47	B2	Low-Mid Tom
48	C3	Hi Mid Tom
49	C3+	Crash Cymbal 1
50	D3	High Tom
51	D3+	Ride Cymbal 1
52	E3	Chinese Cymbal
53	F3	Ride Bell
54	F3+	Tambourine
55	G3	Splash Cymbal
56	G3+	Cowbell
57	A3	Crash Cymbal 2
58	A3+	Vibraslap

MIDI Note #	TS-12 Note	GM Drum Sound
59	B3	Ride Cymbal 2
60	C4	Hi Bongo
61	C4+	Low Bongo
62	D4	Mute Hi Conga
63	D4+	Open Hi Conga
64	E4	Low Conga
65	F4	High Timbale
66	F4+	Low Timbale
67	G4	High Agogo
68	G4+	Low Agogo
69	A4	Cabasa
70	A4+	Maracas
71	B4	Short Whistle
72	C5	Long Whistle
73	C5+	Short Guiro
74	D5	Long Guiro
75	D5+	Claves
76	E5	High Wood Block
77	F5	Low Wood Block
78	F5+	Mute Cuica
79	G5	Open Cuica
80	G5+	Mute Triangle
81	A5	Open Triangle

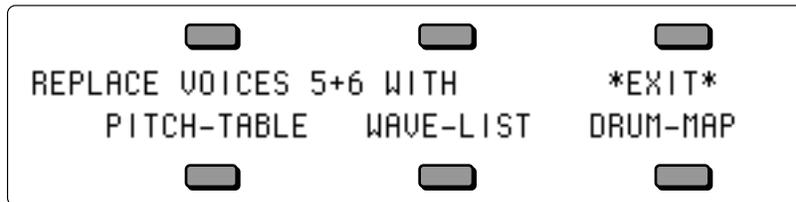


How to Create a Drum-Map

- Select a program into which you want to install a custom drum-map.
- Press **Program Control**. The display shows the Program Control page:

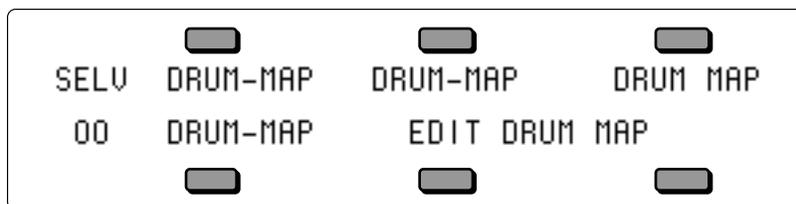


- Make sure OPTION=*-NONE-* is underlined.
- Press the **Up Arrow** button. The display reads:



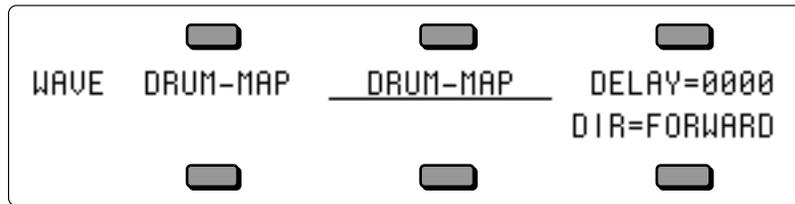
Whenever you create a custom drum-map, the TS-12 will delete voices 5 and 6, and use the memory normally occupied by those parameters to store the drum-map.

- Press the soft button underneath **DRUM-MAP** to replace voices 5 & 6, and create a new default drum-map in the program. Selecting **DRUM-MAP** will also display the Select Voice page with the **Edit Drum-Map** option activated. Note that the Program Control page will now show **OPTION=DRUM-MAP** to indicate that a drum-map is active in the program. The display looks something like this:



- Select one of the four available voices. In the example above, the first voice is selected

- Press the Wave button. The display shows:

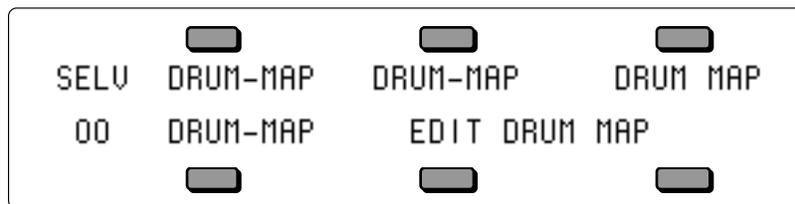


- As you can see, activating a Drum-Map in a Program automatically changes the Wave for the four remaining voices to Drum-Map. Your edited program now contains a Drum-Map and all four voices will play the Drum-Map.

Note: When a Program contains a Drum-Map, the OCTAVE and SEMITONE values on the PITCH page will have no effect on the Drum-Map. You can still use pitch modulation to obtain more drastic pitch shifts than are possible within the PITCH parameter in the Drum Map Editor.

Editing a Drum-Map

When a Drum-Map is active within the current program, the Select Voice page looks something like this:



The wave names of the four voices are shown with their mute status indicators, but the locations where voices 5 and 6 would normally be shown are occupied by the Edit Drum-Map command.

When the displayed wave name for a voice is DRUM-MAP, the actual individual wave name for *each key* of the drum-map is shown only on the Drum-Map Editor page (accessed by selecting EDIT DRUM-MAP). If a voice's displayed wave name is anything other than DRUM-MAP (for example, SAW-WAVE2, as in voice 3 above), then that voice will sound using the displayed wave whenever it receives a key from the drum-map.

The lower left corner of the display indicates the current Patch Select status, which has special significance for programs containing Drum-Maps. For each of the four Patch Select settings, the mute status of the four voices controls which voices will respond to drum-map keys assigned to that patch. In the Drum-Map Editor, each key is assigned to one of the four patches *or* to a single default drum-voice template which resides in ROM.

- Press either soft button beneath EDIT DRUM-MAP. This takes you to the Drum Map Editor page, where you can assign different waves, volume levels, panning, and voice output assignments to each key across the keyboard. For complete descriptions of the Drum Map Editor parameters, see *Section 9 — Program Parameters*.

Note: Remember to save the edited program after you have created and edited a drum-map.

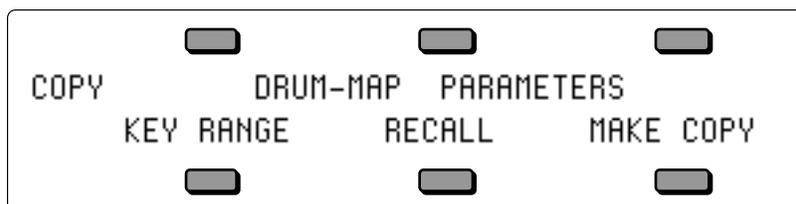
Removing a Drum-Map

If a program contains a custom drum-map and you wish to remove it (thus restoring voices 5 and 6) you can do so from the Program Control page. To remove a custom drum-map:

- Press **Program Control** to display the Program Control page.
- Underline **OPTION=DRUM-MAP**.
- Press the **Down Arrow** button.
- The TS-12 will ask **ERASE CURRENT DRUM-MAP?**
- Press ***YES***. You are returned to the Select Voice page, the custom drum-map is gone, and voices 5 and 6 are reset to their default voices.

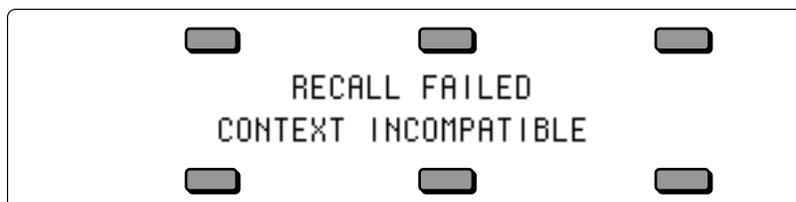
Using the Copy page with Drum-Maps

Pressing **Copy** from the Drum-Map Editor page will display the Copy page with the following options:

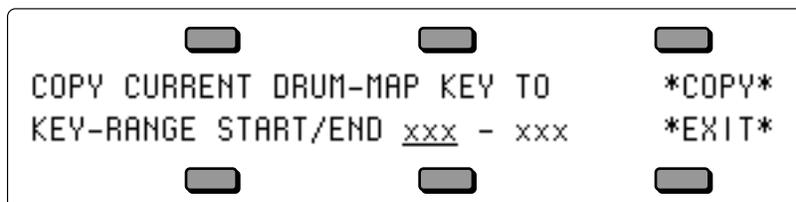


The **MAKE COPY** option allows you to make a copy of the complete Drum-Map from the currently selected program (or the Compare Buffer) into the Copy Buffer.

The **RECALL** option allows you to recall the complete Drum-Map from the Copy Buffer into an edited version of the current program if 1) the current program has a Drum-Map installed in it and 2) the Copy buffer contains a Drum-Map. If you attempt to recall a Drum-Map into a program without just previously having copied a Drum-Map into the Copy buffer, the copy is not completed and the following message is displayed:



Selecting the **KEY RANGE** option will display another page which allows you to fill a range of keys with copies of the currently selected Drum-Map key (the key that was shown on the Drum-Map Editor page when you pressed **Copy**).



You can specify the range of keys in the drum-map to be filled by selecting the **KEY-RANGE START/END** parameter and then playing the lowest and then highest key of the range. You can also edit these parameters using the **Data Entry Slider** or the **Up/Down Arrow** buttons. Press the soft button to select between the Start and End key fields.

Selecting ***COPY*** will complete the command and will show **COPY DONE** before returning to the Copy page.

Selecting ***EXIT*** will simply return the Copy page without affecting the Drum-Map.

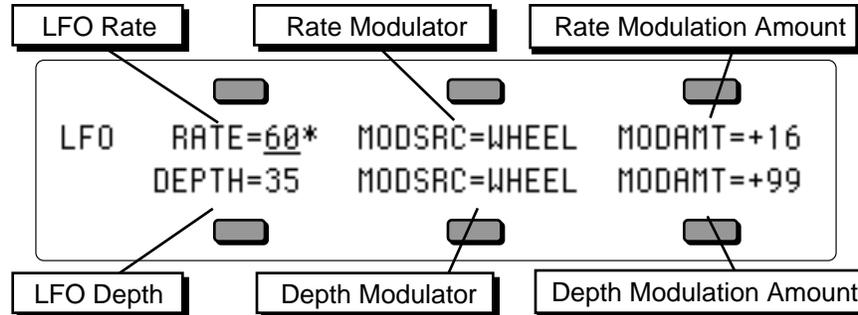
Section 9 — Program Parameters

This section covers the parameters which can be edited independently for each Voice within a Program. For a general overview of the program concepts involved, refer to the previous section.

LFO Page

The LFO Page contains the parameters related to the Low Frequency Oscillator. Each voice in a program has its own LFO, which can be assigned as a modulator wherever a modulation source is selected. LFO's are commonly used to create vibrato, tremolo and other effects.

Press the LFO button. This takes you to the first sub-page of the LFO page:



LFO RATE

Range: 00 to 99

Determines the speed of the LFO. The table below shows the frequency (in hertz) for each value:

LFO FREQUENCIES

value	time (in Hz)								
0	.00	20	.63	40	2.17	60	4.77	80	7.37
1	.01	21	.67	41	2.30	61	4.90	81	7.50
2	.03	22	.70	42	2.43	62	5.03	82	7.63
3	.07	23	.73	43	2.56	63	5.16	83	7.76
4	.10	24	.77	44	2.69	64	5.29	84	7.89
5	.13	25	.80	45	2.82	65	5.42	85	8.02
6	.17	26	.83	46	2.95	66	5.55	86	8.15
7	.20	27	.87	47	3.08	67	5.68	87	8.28
8	.23	28	.90	48	3.21	68	5.81	88	9.28
9	.27	29	.93	49	3.34	69	5.94	89	10.28
10	.30	30	.97	50	3.47	70	6.07	90	11.28
11	.33	31	1.00	51	3.60	71	6.20	91	12.28
12	.37	32	1.13	52	3.73	72	6.33	92	13.28
13	.40	33	1.26	53	3.86	73	6.46	93	14.28
14	.43	34	1.39	54	3.99	74	6.59	94	15.28
15	.47	35	1.52	55	4.12	75	6.72	95	16.28
16	.50	36	1.65	56	4.25	76	6.85	96	17.28
17	.53	37	1.78	57	4.38	77	6.98	97	18.28
18	.57	38	1.91	58	4.51	78	7.11	98	19.28
19	.60	39	2.04	59	4.64	79	7.24	99	20.28

Track RATE Mod Selector

Range: enabled (*) or disabled (blank)

Press the soft button above the RATE parameter again to enable or disable the Track RATE parameter independently for each LFO. When an asterisk (*) is displayed, the Track RATE parameter will affect the Rate of the LFO. If there is no asterisk, then the Track RATE parameter will have no effect on the Rate of the LFO. This allows you to define whether or not each voice in a Program will have its LFO Rate modulated by the Track RATE parameter. Successive presses

of the soft button above RATE will toggle between the Rate value and the Track RATE Mod selector.

Tip: If you set the LFO Rate to 00, and the RESTART-MODE parameter to ON, you can use the LFO as a gated modulator with a variable depth. Use WAVESHAPE=SQUARE, because it starts high.

RATE MODSRC Range: various
Selects a modulation source for LFO RATE from among the 15 available modulators.

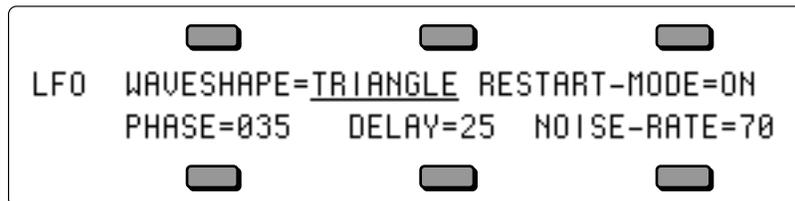
RATE MODAMT Range: 00 to 99
Determines the amount by which the assigned RATE modulator will affect the LFO RATE. The effect of RATE MODAMT is *added* to the effect of the LFO RATE parameter.

DEPTH Range: 00 to 99
Sets the “manual” level of the LFO. DEPTH controls the initial amount of LFO.

DEPTH MODSRC Range: various
Selects a modulation source for LFO DEPTH from among the 15 available modulators.

DEPTH MODAMT Range: -99 to +99
Determines the amount by which the assigned DEPTH modulator will affect the LFO DEPTH. The effect of DEPTH MODAMT is *added* to the effect of the LFO DEPTH parameter.

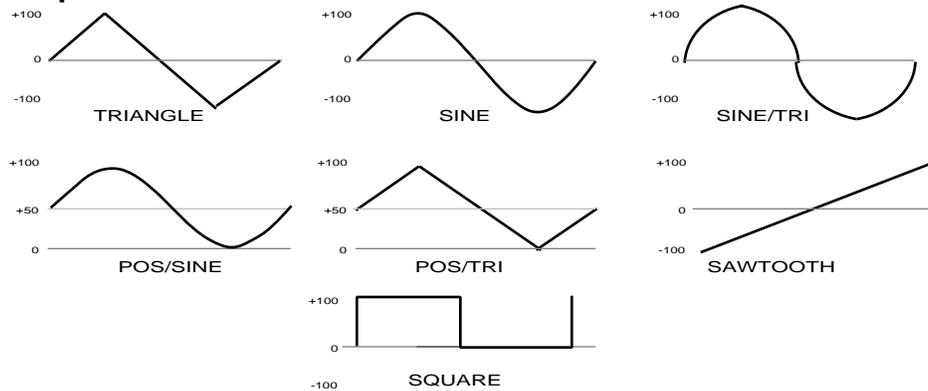
Press the LFO button again to access the second sub-page of the LFO page. The display reads:



WAVESHAPE Range: various (see below)
The Waveshape determines how the LFO signal will rise and fall. There are seven possible values:

- TRIANGLE — the triangle wave is commonly used to modulate pitch to produce vibrato.
- SINE — the sine wave is a pure fundamental frequency, more rounded in its peaks and valleys than the triangle wave.
- SINE/TRI — a mixture of a sine and triangle wave, a sort of pointy sine wave.
- POS/SINE — the POS/SINE is a positive-only sine wave, similar in application to the POS/TRI.
- POS/TRI — the POS/TRI is a positive-only triangle wave useful for simulating vibrato on sounds like the guitar, where vibrato techniques are limited to bending the note up.
- SAWTOOTH — the sawtooth wave is commonly used for special effects.
- SQUARE — this positive-only square wave is useful for producing in-tune trill effects.

LFO Waveshapes



RESTART-MODE

Range: OFF or ON

Determines whether the LFO will restart with each keystroke. When set to OFF, the LFO will cycle continuously without resetting. When set to ON, the LFO waveform will always start at the starting phase, as determined by the PHASE parameter, each time a new key is struck.

PHASE

Range: 000 to 255

Determines the starting phase of the LFO, when RESTART-MODE=ON. With a setting of 000, the LFO will always restart at the beginning of its cycle.

DELAY

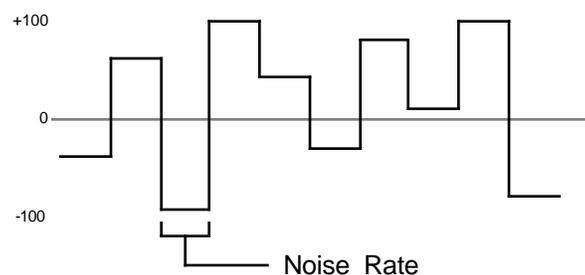
Range: 00 to 99

Determines the time it takes for the LFO to go from zero to the amount set with the DEPTH parameter. Values above 0 will cause the LFO to take longer to achieve its full depth. This is useful for creating delayed vibrato, tremolo, etc.

NOISE-RATE

Range: 00 to 99

One of the TS-12's 15 available modulation sources is NOISE. The NOISE modulator produces a randomly changing level. Its main use is to randomize or "humanize" pitch when applied as a pitch modulator. It can also be used to randomize any other modulation destination. Typically, the NOISE signal might look like this:



NOISE-RATE determines how frequently the random level will change. Low values will cause it to change very slowly; with high values the level will change quickly.

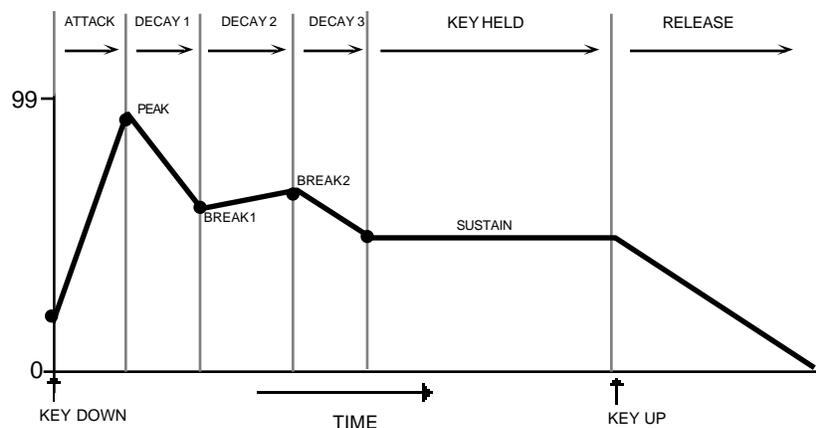
ENV1, ENV2, ENV3 — TS-12 Envelopes

An *Envelope* is a shape, or contour, which we apply to a signal source to make it change over time. Each TS-12 voice has three envelopes. These envelopes are automatically routed to the pitch, filter frequency and amplitude of the voice, though ENV1 and ENV2 can also be assigned elsewhere, wherever a modulator is selectable.

- ENV1 is routed to the *pitch* of the voice. There is a parameter always available on the Pitch Mods page which lets you adjust the amount by which ENV1 will modulate the voice's pitch.
- ENV2 is routed to the *filter cutoff frequency* of the voice. For each of the voice's two filters, the ENV2 parameter on the Filters page controls the ENV2 depth.
- ENV3 is routed to the *amplitude (volume)* of the voice. ENV3 *always* controls the final volume contour of the voice. Any other volume modulators selected on the Output page will occur before ENV3 in the signal flow.

The TS-12 envelopes are descended from the venerable ADSR (attack, decay, sustain, release) envelope, but with many refinements. While the ADSR envelope gives you control over three time segments and one level, the TS-12 envelopes give you control over *four* levels and *five* time segments.

The illustration below shows the make-up of a TS-12 envelope:



Each envelope page consists of three sub-pages, which are reached by repeatedly pressing the **Env 1**, **Env 2**, or **Env 3** button. For each envelope page:

- The first sub-page contains the five time segments: **ATTACK**, **DECAY1**, **DECAY2**, **DECAY3** and **RELEASE**.
- The second sub-page contains the four levels: **PEAK**, **BREAK1**, **BREAK2**, **SUSTAIN**; this sub-page also contains the **VEL-LEV** velocity-to-levels modulation amount.
- The third sub-page contains the Envelope mode, keyboard scaling, and several parameters for shaping the velocity response of the envelope.

ENV1, ENV2 and ENV3 Pages

The ENV1, ENV2 and ENV3 Pages, parameters and ranges are all the same except where indicated below. We will use ENV3 as our example, since its effect on the volume of the voice is immediately apparent.

Press the **Env 3** button to get to the first ENV3 sub-page containing the five TIME parameters:



Note that the numbers shown here represent *times*, not rates. That is, the envelope will take a fixed amount of time to go from one level to another no matter how close together or far apart those two levels are.

ATTACK Range: 00 to 99 (see the Envelope Times chart below for a listing of the time values)

The amount of time it takes for the envelope level to travel from zero (when the key is struck) to the PEAK level. The higher the value, the longer the time.

Track Attack Mod Selector Range: enabled (*) or disabled (blank)

Press the soft button above the ATTACK parameter again to enable or disable the Track ATTACK parameter independently for each Envelope. When an asterisk (*) is displayed, the Track ATTACK parameter will affect the Attack Time of the Envelope. If there is no asterisk, then the Track ATTACK parameter will have no effect on the Attack Time of the Envelope. This allows you to define whether or not each Envelope in each Voice in a Program will have its Attack Time modulated by the Track ATTACK parameter. Successive presses of the soft button above ATTACK will toggle between the Attack value and the Track ATTACK Mod selector.

DECAY 1 Range: 00 to 99

The time it takes the envelope to go from PEAK to BREAK 1.

DECAY 2 Range: 00 to 99

The time it takes the envelope to go from BREAK 1 to BREAK 2.

DECAY 3 Range: 00 to 99

The time it takes the envelope to go from BREAK 2 to the SUSTAIN stage. At the end of DECAY 3, the envelope will remain at the SUSTAIN level until the key is released.

RELEASE Range: 00 to 99

This defines the time it will take the envelope to return to zero after the key has been released.

Track Release Mod Selector Range: enabled (*) or disabled (blank)

Press the soft button below the RELEASE parameter again to enable or disable the Track RELEASE parameter independently for each Envelope. When an asterisk (*) is displayed, the Track RELEASE parameter will affect the Release Time of the Envelope. If there is no asterisk, then the Track RELEASE parameter will have no effect on the Release Time of the Envelope. This allows you to define whether or not each Envelope in each Voice in a Program will have its Release Time modulated by the Track RELEASE parameter. Successive presses of the soft button below RELEASE will toggle between the Release value and the RELEASE Mod selector.

ENVELOPE TIMES

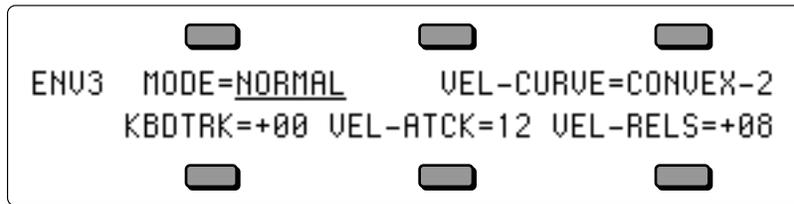
	time value (in sec)								
0	.00	20	.20	40	.82	60	3.2	80	13
1	.01	21	.22	41	.88	61	3.5	81	14
2	.02	22	.23	42	.94	62	3.7	82	15
3	.03	23	.25	43	1.0	63	4.0	83	16
4	.04	24	.27	44	1.0	64	4.3	84	17
5	.06	25	.29	45	1.1	65	4.6	85	18
6	.07	26	.31	46	1.2	66	4.9	86	19
7	.08	27	.33	47	1.3	67	5.3	87	21
8	.08	28	.35	48	1.4	68	5.7	88	22
9	.09	29	.38	49	1.5	69	6.1	89	24
10	.10	30	.41	50	1.6	70	6.5	90	26
11	.11	31	.44	51	1.7	71	7.0	91	28
12	.11	32	.47	52	1.8	72	7.5	92	30
13	.12	33	.50	53	2.0	73	8.1	93	32
14	.13	34	.54	54	2.1	74	8.6	94	34
15	.14	35	.58	55	2.3	75	9.3	95	37
16	.15	36	.62	56	2.4	76	9.9	96	39
17	.16	37	.66	57	2.6	77	10	97	42
18	.17	38	.71	58	2.8	78	11	98	45
19	.19	39	.76	59	3.0	79	12	99	49

Press **Env 3** again. This takes you to the second ENV3 sub-page, which shows the five LEVELS:

ENV3 LEVELS	PEAK=99	BREAK1=92
BREAK2=86	SUSTAIN=76	VEL-LEV=70

- PEAK** Range: 00 to 99
Determines the level the envelope will reach at the end of the time defined by ATTACK.
- BREAK 1** Range: 00 to 99
Determines the level the envelope will reach at the end of DECAY 1.
- BREAK 2** Range: 00 to 99
Determines the level the envelope will reach at the end of DECAY 2.
- SUSTAIN** Range: 00 to 99
Determines the level the envelope will reach at the end of DECAY 3 and retain as long as the key is held down.
- VEL-LEV** Range: 00 to 99
The Velocity level parameter will lower all envelope level settings with a softer keystrike. This means the settings you assign to PEAK, BREAK 1, and BREAK 2 and SUSTAIN are maximum levels — the levels that will be reached with the hardest keystrike. The amount of VEL-LEV will determine how much those levels will be reduced as you play softer. With this parameter you can have continuous dynamic control over the five levels by varying how hard you play. The Velocity Curve (VEL-CURVE on next sub-page) controls the response of the VEL-LEV parameter, reshaping the way that velocity modulates the envelope levels. This provides further control over the velocity response of the envelope.

Press the **Env 3** button again. This displays the final sub-page for ENV 3:



MODE (ENV 1 and ENV 2)

Range: NORMAL, FINISH, or REPEAT

- **NORMAL** — The envelope plays through normally.
- **FINISH** — The envelope runs its full cycle — finishes playing through all its stages — ignoring the key-up event. The envelope spends no time at the sustain stage. As soon as DECAY 3 is finished, instead of stopping at the sustain stage the envelope immediately goes into the release stage. This is good for percussive-type sounds where you want the envelope to be the same for every note, no matter how long the key is held down.
- **REPEAT** — In this mode, at the end of the DECAY3 stage, instead of sustaining, the envelope goes immediately back to the beginning of the envelope and repeats. When the key is released, the envelope stops repeating, and moves into the release stage. This type of envelope can be used to create complex LFO-type effects. When ENV3 is set to MODE=REPEAT, each time Envelope 3 restarts it will restart the Wave from its SAMPLE-START-OFFSET value.

MODE (ENV 3)

Range: NORMAL, FINISH, or REPEAT

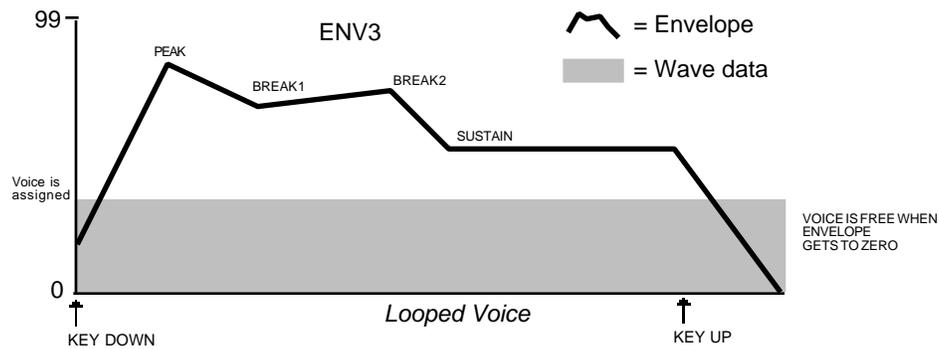
Voice Triggering/Stealing Notes

Since Env 3 controls the volume of the voice, there are a number of special considerations to be aware of when using the different envelope modes:

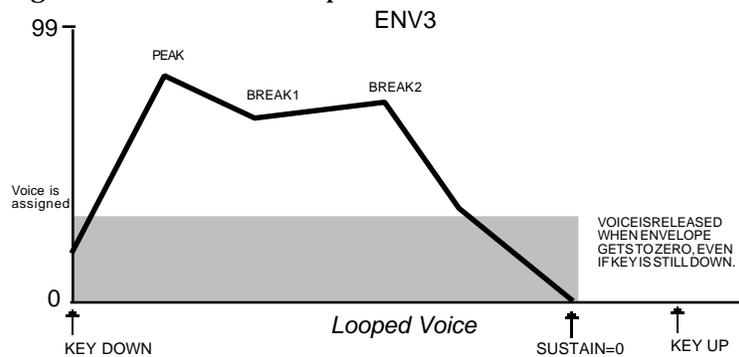
- In **NORMAL** mode, if you set a delay on the voice, and you release the key before the designated delay time elapses, the voice will not sound.
- In **FINISH** mode, if you set a delay on the voice and you release the key before the designated delay time elapses, the note will sound anyway, and then envelope will run through its full cycle. The envelope finishes what you set it up to do.
- In **REPEAT** mode, the envelope will repeatedly cycle through the PEAK and BREAK 1 and 2 LEVELS, using the ATTACK and all three DECAY times, for as long as the key is held down. When envelope gets to the SUSTAIN level, it goes back to the INITIAL level. The TS-12 restarts the wave at its SAMPLE-START-OFFSET every time the envelope repeats.

In order to maximize the use of the TS-12's 32 voices, and to manage the "voice stealing" it is sometimes useful to understand when a given voice will be assigned and when it will be released, or "put back" into the pool for use by other sounds. This depends on a combination of envelope mode and the wave type.

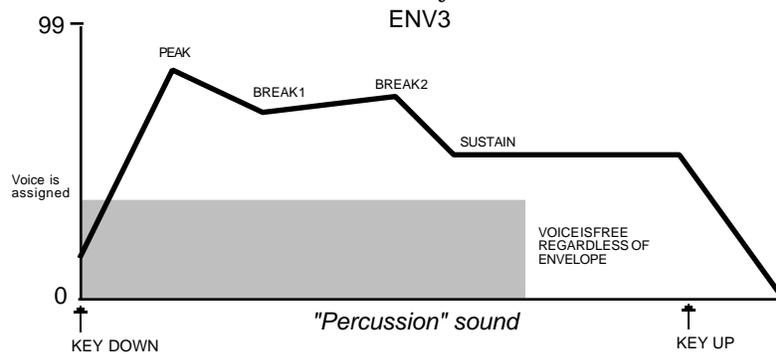
A looped (sustaining) wave will continue to use the voice until the envelope reaches zero. For a sustaining wave, when the Envelope Mode is Normal:



For a sustaining wave, when the Envelope Mode is set to Finish:



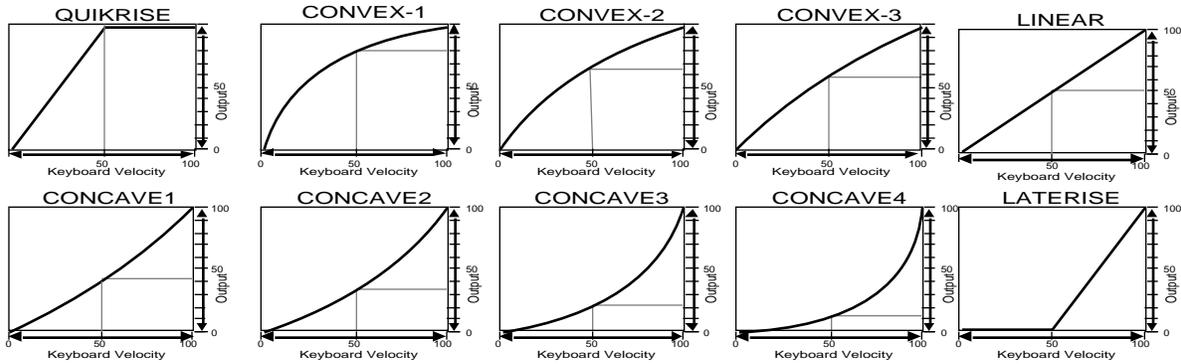
For unlooped, non-sustaining, waves (specifically those in the Percussion and Drum categories) the voice becomes free as soon as the sample has played through to the end, no matter where the envelope level is. The voice is released for use by another sound:



VEL-CURVE

Range: (described below)

This selects which of the ten available velocity response curves the envelope will use if the velocity level control (VEL-LEVEL) is set to some value other than zero. The velocity response curves are shown on the next page. Available values are: QUIKRISE, CONVEX-1, CONVEX-2, CONVEX-3, LINEAR, CONCAVE1, CONCAVE2, CONCAVE3, CONCAVE4, and LATERISE.



KBDTRK

Range: -99 to +99

KBDTRK makes the envelope times shorter or longer depending on the key played. The scaling effect of this parameter is based on a 76-note keyboard, with a center break point at F4+.

Positive values will make all envelope times (except Release) shorter for keys above F4+, and longer for keys below F4+. Negative values will have the opposite effect. Envelope times for F4+ are not affected by this parameter.

VEL-ATCK

Range: 00 to 99

This parameter makes envelope ATTACK time respond to velocity. Raising the VEL-ATCK value above zero makes the envelope ATTACK time shorter with harder keystrikes. If ATTACK=00, this parameter will have no effect.

VEL-RELS

Range: -99 to +99

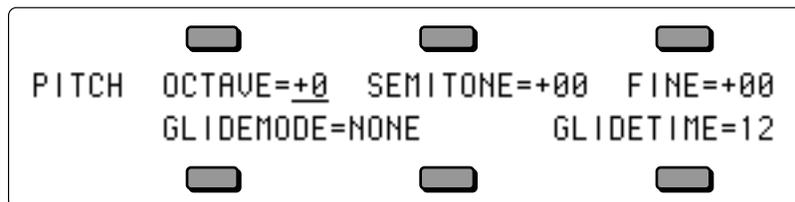
This parameter makes envelope RELEASE time respond to velocity. When the value of VEL-RELS is positive, a harder keystrike will result in a longer release. Likewise, when the value of VEL-RELS is negative, a harder keystrike will result in a shorter release. Note that this parameter will have no effect if RELEASE = 00.

Pitch Page

The Pitch page parameters determine the “manual” levels for the pitch of the voice, as well as the poly/mono voice assignment mode.

Note: When a Program contains a Drum-Map, the OCTAVE and SEMITONE values on the PITCH page will have no effect on the Drum-Map. You can still use pitch modulation to obtain more drastic pitch shifts than are possible within the PITCH parameter in the Drum Map Editor.

Press the **Pitch** button. The display shows the PITCH page.



OCTAVE Range: -4 to +4 octaves

Changes the pitch of the voice by octaves.

SEMITONE Range: -11 to +11

Changes the pitch of the voice by semitones. Incrementing/decrementing this control beyond +11 or -11 automatically increases/decreases the octave by one.

FINE Range: -99 to +99

Fine-tunes the pitch of the voice by steps of one cent (1/100 of a semitone).

GLIDEMODE Range: (described below)

Enables Glide (portamento) and several forms of monophonic voice assignment in each voice. There are six GLIDE modes available:

For monophonic voice assignment without glide, set GLIDEMODE to LEGATO, TRIGGER, or MINIMODE, and set TIME=0.

- **NONE** — Glide is off. This is normal polyphonic operation, with no portamento.
- **PEDAL** — Enables the sustain pedal to start polyphonic glide. In this mode, the glide and polyphony are controlled by the sustain pedal. When the pedal is up, there is no glide and the voice is fully polyphonic. When the sustain pedal is depressed, the glide is enabled, and the polyphony is limited to the number of notes being sounded at the moment. For example, with the pedal up play a three-note chord. Press the sustain pedal and lift your fingers off the keys (the three notes will sustain). Now press another key: one of these sustaining notes will be stolen and will glide to the new note. The envelopes and waves are retriggered, or restarted, each time there is a new key down. Holding a key down will prevent the note from being stolen. This allows controlled voice leading.
- **MONO** — Similar to mono mode on old analog synths. The voice will play with one-note polyphony, and new notes will always glide from the previous note. The envelopes and waves are always retriggered, or restarted, each time there is a new key down.
- **LEGATO** — Enables monophonic voice assignment, allowing only one note of polyphony to be active in the voice. If a key is depressed before another is released (i.e.: if you play legato), the voice will glide from the old note to the new one. If you play a key with no other keys down (i.e.: if you play staccato), the voice will not glide. The envelopes and waves are retriggered, or restarted, from the beginning each time there is a new key down.
- **TRIGGER** — This mode plays monophonically, with the envelopes and waves retriggering, or restarting, each time there is a new key down. This mode works just like LEGATO mode, except that it has no “note memory”. It is ideal for adding monophonic piano “thuds” to piano sounds.
- **MINIMODE** — This mode plays with one-voice polyphony, and new notes will glide from the previous note if the previous note is still held. Unlike the PEDAL, MONO, LEGATO or TRIGGER modes, the envelopes and waves are only restarted from the beginning when you play a key with no other keys down (i.e.: if you play staccato).

Note: MONO, LEGATO and MINIMODE feature “note memory.” If you release a key while still holding down another key, the pitch will glide back to the note you are holding. Holding down the sustain pedal will dynamically disable note memory.

GLIDE MODES

MODE	Staccato Glide	Legato Glide	Legato Envelope Retrigger	Note Memory
PEDAL (WITH PEDAL DOWN)	YES	YES	YES	NO
MONO	YES	YES	YES	YES
LEGATO	NO	YES	YES	YES
TRIGGER	NO	YES	YES	NO
MINIMODE	NO	YES	NO	YES

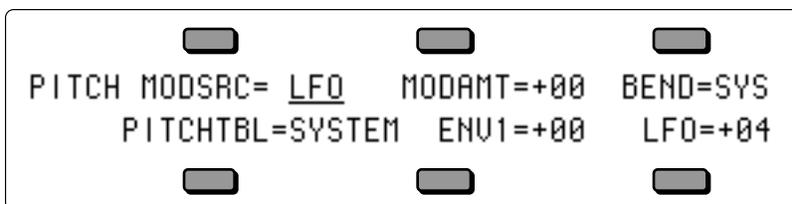
GLIDETIME Range: 00 to 99

This parameter controls the time it takes for the pitch to slide smoothly (glide) from one note to another. The higher the value, the longer the glide time. The TS-12 uses *Constant-Time Portamento*. This means that it will take the same amount of time to glide between notes that are close together (i.e.: C4 to D4) as it will to glide between notes that are far apart (i.e.: C4 to C7).

Pitch Mods Page

The Pitch Mods page parameters control pitch modulation for the voice.

Press the **Pitch Mods** button. The display shows the Pitch Mods page.



MODSRC Range: various

Selects a modulation source for the pitch of the voice from among the 15 available modulators.

MODAMT Range: -99 to +99

Determines the amount by which the assigned pitch modulator will affect pitch.

BEND Range: 00 to 12, 00H to 12H, or SYS

Determines whether each voice in the program will have its own independent pitch bend range, or whether it will use the system pitch bend range to determine the maximum pitch change that can be applied by the pitch bend wheel. When BEND=SYS, the voice will use the system pitch bend range setting. See the description of the PITCH-BEND parameter on the System Page in *Section 2 — System Page Parameters* for more information on the system pitch bend range.

PITCHTBL Range: SYSTEM, ALL-C4, or CUSTOM

Pitch-tables allow you to map each key on the keyboard to play at any desired pitch. They provide a user-definable tuning table for each note on the keyboard. This parameter lets you select which pitch-table the voice will use.

When you create a custom pitch-table, the TS-12 stores the pitch-table inside the program. Within the program, the custom pitch-table uses the space normally used to store the parameters for voices 5 and 6. Therefore, when there is a custom pitch-table in a program, voices 5 and 6 are not available. They are replaced on the Select Voice page by the EDIT PITCH TABLE function. Of the remaining four voices, each individual voice can be assigned to use either the SYSTEM pitch-table, no pitch-table (ALL-C4), or the CUSTOM pitch-table that resides within the program.

- **SYSTEM** — Uses whatever is selected as the system pitch-table on the System page. Normally this is standard twelve-tone equal temperament tuning across the keyboard. However, a custom pitch-table can be copied into the system pitch-table for use by all sounds. The **PITCH-TABLE** parameter on the System page determines what the System pitch-table will be.
- **ALL-C4** — No pitch tracking — the same pitch (C4) plays across the keyboard.
- **CUSTOM** — User definable pitch-table. This option is only available if a custom pitch-table has been created in the program.

ENV1

Range: -99 to +99

This hard-wired modulation routing determines the amount by which Envelope 1 will affect pitch. Unlike applying ENV-1 as a pitch modulator with the generic pitch MODSRC parameter, the hard-wired ENV1 parameter forces Envelope 1 to always sustain at the manual pitch setting on the Pitch page. The Envelope 1 SUSTAIN level no longer controls the pitch at which Envelope 1 will sustain. Instead, it becomes an "equator-shift" value, determining which Envelope 1 level values will cause the pitch to rise above the manual pitch setting and which level values will drive it below. Envelope 1 level values equal to the SUSTAIN level value will sound at the manual setting. Higher level values will shift the pitch upward from the manual pitch setting, and lower values will shift the pitch downward. This feature allows for the creation of bi-directional pitch envelope shapes, while conveniently ensuring that voices will always sustain at the manual pitch setting, without the need to offset the manual pitch setting on the Pitch page.

LFO

Range: -99 to +99

Determines the amount by which the LFO (Low Frequency Oscillator) will affect pitch.

Filters Page

Each TS-12 voice has its own pair of digital filters, **FILTER 1** and **FILTER 2**, which are connected in series. The filter settings determine which ranges of frequencies will be allowed to pass through to the output.

Low-pass/High-pass

A low-pass filter allows only those frequencies below the filter cutoff frequency to pass — higher frequencies are filtered out. The reverse is true for a high-pass filter — it lets frequencies higher than the cutoff frequency pass and filters out those below. In the TS-12, **FILTER 1** is always a low-pass filter. **FILTER 2** can be either a high-pass or low-pass filter.

Poles — Rolloff Curves

"Pole" is an engineering term which describes the steepness of a filter, or the filter's cutoff *slope*. Each additional pole gives a filter a steeper rolloff curve. In the TS-12, the filter modes are interdependent; that is, the combined number of poles in **FILTER 1** and **FILTER 2** is always four.

These four poles are divided between the two filters; either as 2 and 2, or as 3 and 1. There are two **FILTER** Pages; however, if you change the number of poles on either page, you will change the number of poles on the other page — high-pass will remain high-pass, but the number of poles will change.

A 1-pole filter will rolloff at 6 dB per octave; a 2-pole filter, 12 dB per octave; a 3-pole filter, 18 dB per octave; and 4-pole filter, 24 dB per octave. To reproduce a 4-pole low-pass filter (for that "classic" analog synth sound) you would set both low-pass filters to roll off at 12 dB per octave, resulting in a 24 dB per octave rolloff.

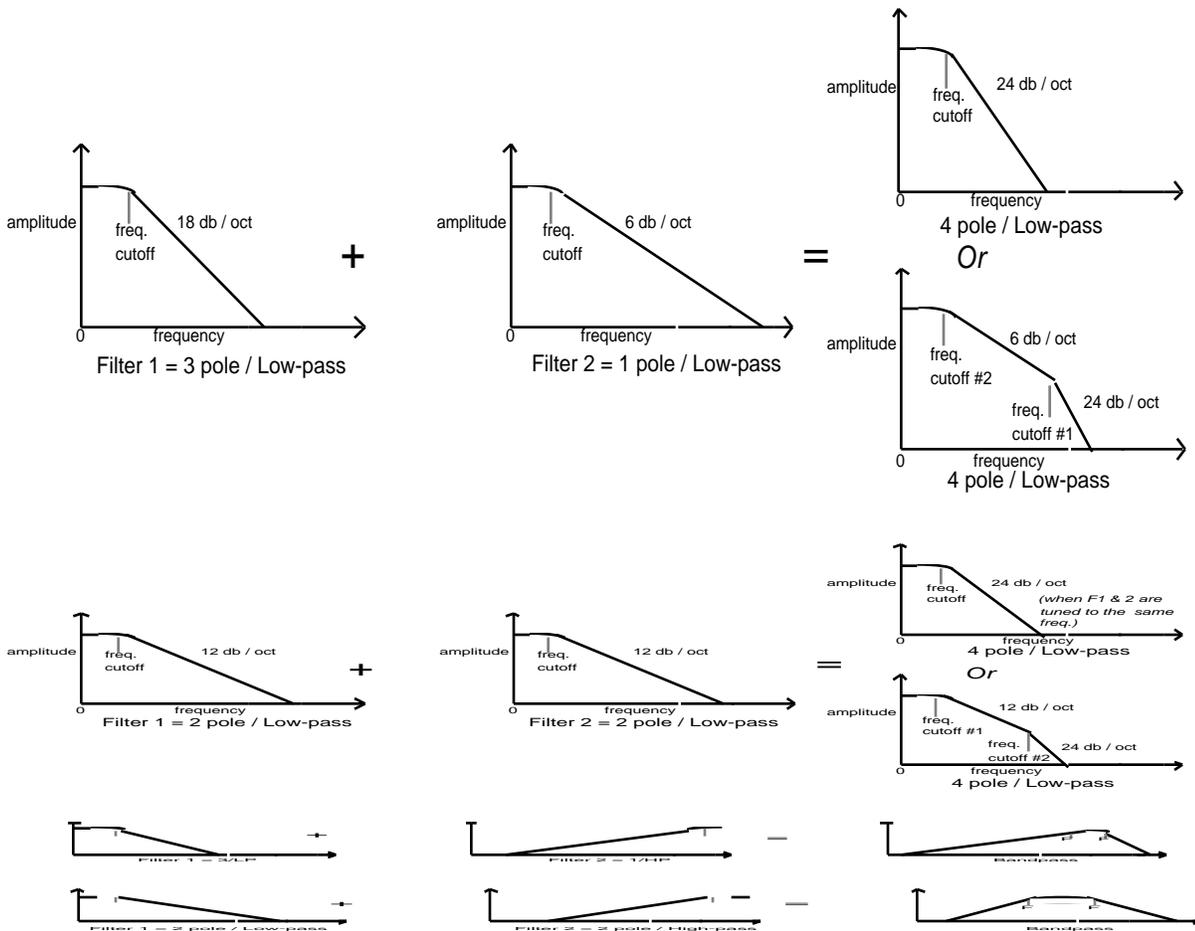
Cutoff Frequency

Every filter has a "knee" in the response curve, known as the cutoff frequency. This is the frequency at which the filter begins filtering out frequencies. The filter cutoff frequency can remain fixed over time, or it can be varied by modulating the filter with an envelope, LFO,

velocity, etc. You can create some very interesting filter configurations by using a different modulator for each filter. For instance, try using pressure to modulate the filters. You can drive one filter up with pressure, while simultaneously driving the other down.

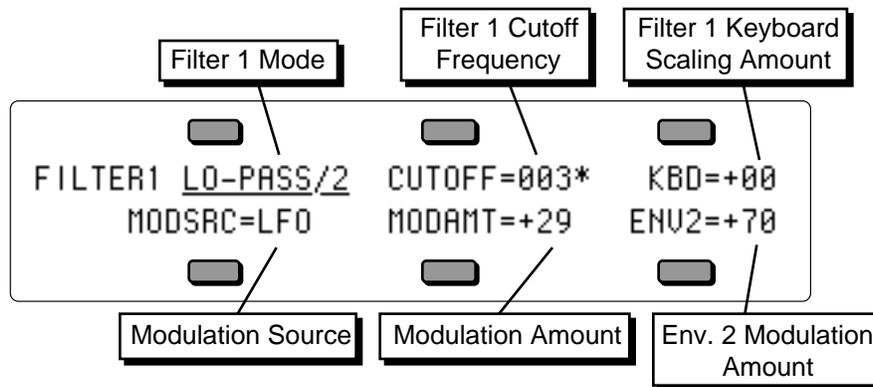
Filter Configurations

The diagrams below show a number of possible filter configurations. On the left are the response curves of the two filters shown separately. On the right are some of the possible shapes of the combined filters.



FILTER 1 Page

Press the **Filters** button. The display shows the FILTER1 page.



FILTER1 Mode Range: LO-PASS/2 or LO-PASS/3

Determines whether Filter 1 will be a 2-pole or a 3-pole low-pass filter.

CUTOFF Range: 000 to 127

Determines the initial filter cutoff frequency for each of the two filters. With a low-pass filter, a setting of 127 lets all the original signal pass through the filter. With a high-pass filter, a setting of 000 lets through all of the original signal. This setting represents the “filter floor,” or manual level. The effect of any selected modulators will be added to (or subtracted from) this level.

Track Brightness Mod Selector Range: enabled (*) or disabled (blank)

Press the soft button above the CUTOFF parameter again to enable or disable the Track BRIGHTNESS parameter independently for each Filter. When an asterisk (*) is displayed, the Track BRIGHTNESS parameter will affect the Cutoff frequency of the Filter. If there is no asterisk, then the Track BRIGHTNESS parameter will have no effect on the Cutoff frequency of the Filter. This allows you to define whether or not each Filter in each Voice in a Program will have its Cutoff frequency modulated by the Track BRIGHTNESS parameter. Successive presses of the soft button above CUTOFF will toggle between the Release value and the BRIGHTNESS Mod selector.

KBD Range: -99 to +99

Sets the amount by which the location of a note on a keyboard will modulate the filter cutoff frequency (filter keyboard tracking). The scaling effect of this parameter is based on a 76-note keyboard, with a center break point at F4+. To have the filter track the keyboard exactly, set KBD=+50.

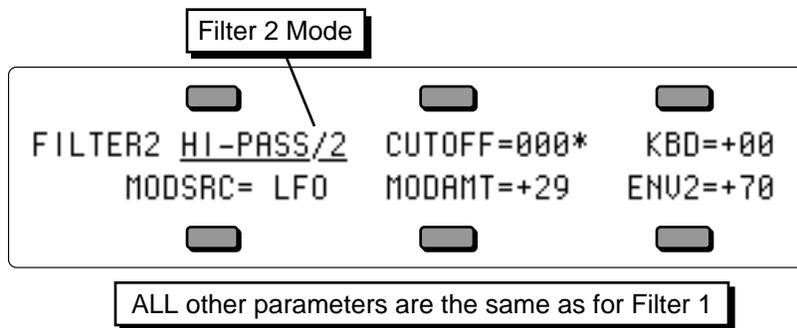
MODSRC Range: various
 Selects a modulation source for the filter cutoff frequency from among the 15 available modulators.

MODAMT Range: -99 to +99
 Determines the amount by which the assigned filter modulator will affect the filter cutoff frequency.

ENV2 Range: -99 to +99
 Determines the amount by which Envelope 2 will affect the filter cutoff frequency.

FILTER 2 Page

Press the **Filters** button again. The display shows the FILTER2 page:



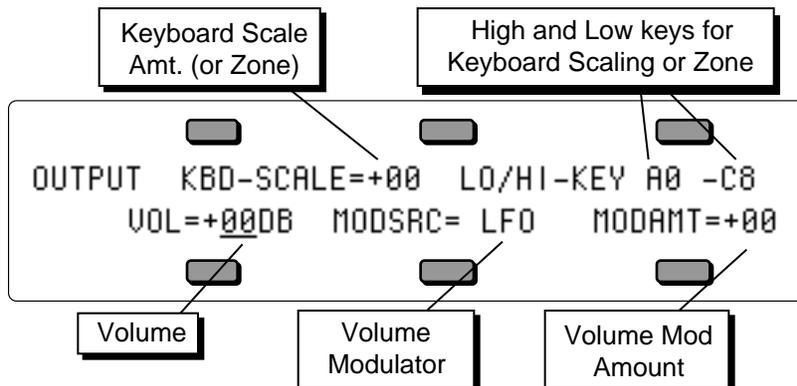
Filter 2 Mode Range: HI-PASS/2, 1 or LO-PASS/2, 1
 FILTER 2 can be configured as a 2-pole or 1-pole high-pass filter, or a 2-pole or 1-pole low-pass filter.

The remaining parameters and ranges are the same as for FILTER 1.

Output Page

The parameters on the Output page, along with Envelope 3, control the overall volume and panning of the voice, along with keyboard scaling, effects routing and voice “voice stealing” priority. The Output page consists of three separate sub-pages.

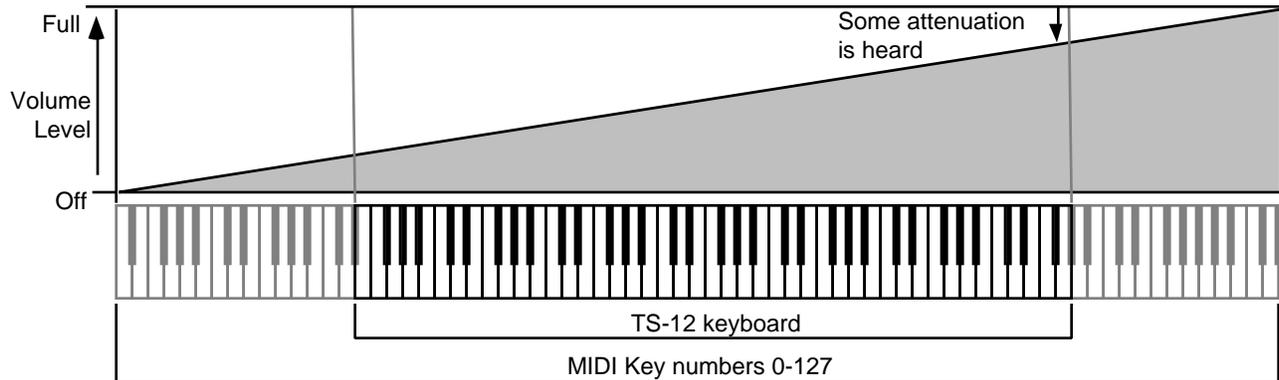
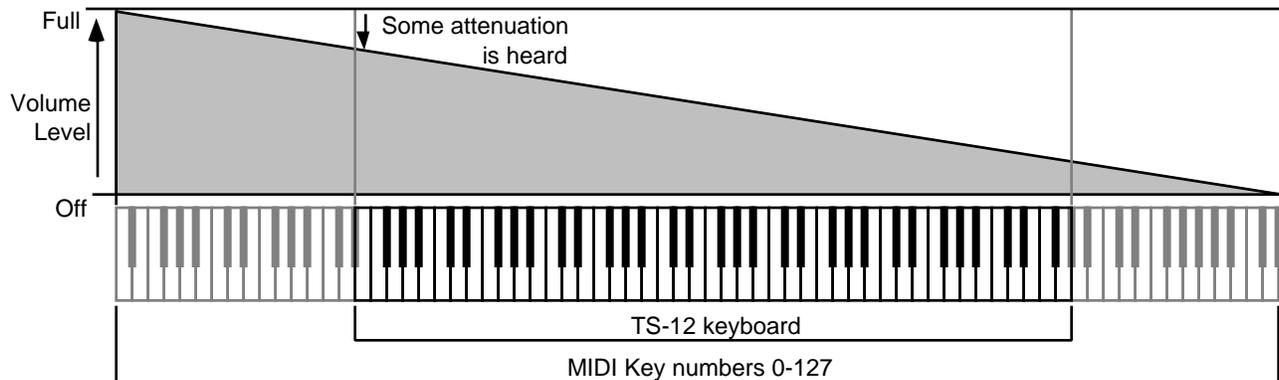
Press the **Output.** button. The first OUTPUT sub-page is displayed.



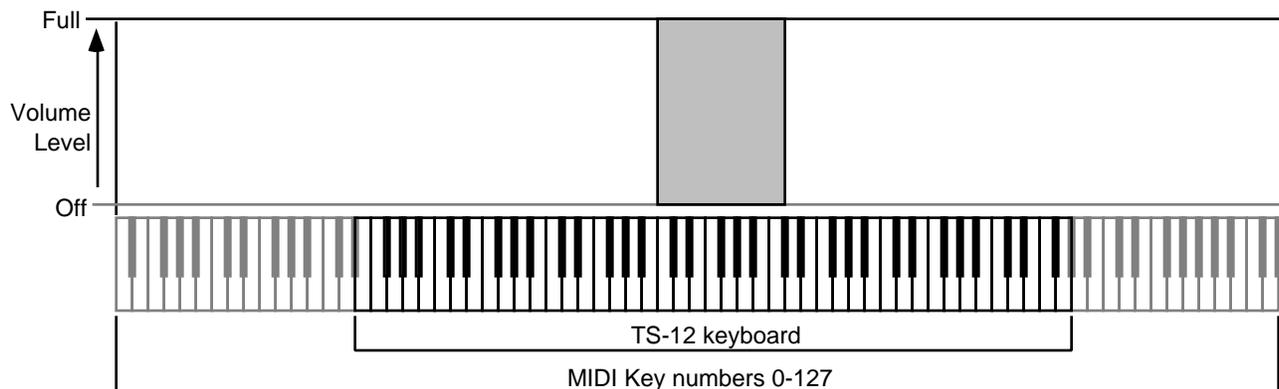
OUTPUT KBD-SCALE Range: -99 to +99, or ZON

Can be used to fade the voice in or out between the two keys specified to the right (see below).

This is good for doing keyboard crossfades between voices, or for reducing the volume of a particular voice as you go higher up the keyboard. A value of +99 will fade the voice *in* from silence to full level from the low keys to the high keys. A value of -99 will fade the voice *out* from full level to silence from the low keys to the high keys. Intermediate values will scale the voice from full level to an intermediate level.

With KYB-SCALE=+99 and LO/HI KEY=A0 to C8:**With KYB-SCALE=-99 and LO/HI KEY=A0 to C8:****Setting a Keyboard Zone**

Moving the **Data Entry Slider** all the way down to the bottom position (below -99) selects **KBD-SCAL=ZON**. In this position the voice will sound only over the keyboard range specified by the low and high keys. When **KBD-SCAL=ZON**, the volume scaling function is not in effect — the voice will play at the same volume throughout the zone.

With KYB-SCALE=ZON and LO/HI KEY=C4 to C5:

The next two parameters on the top line of the display provide a powerful tool for shaping the volume of the sound across the keyboard:

LO/HI-KEY

Range: -A0 to C8

Sets the key range over which the fade-in, fade-out, or keyboard zone will occur. When this parameter is selected, notes can be entered from the keyboard or using the **Data Entry Slider** or **Up/Down Arrow** buttons. Select this parameter and play the low key; that note is entered as the low key, and the cursor switches to the high key. Now play the high key; that note is entered as the high key, and the cursor disappears. If you made a mistake, or want to enter a different range of values, just press the soft button again and repeat the process.

VOL

Range: -50 to +14 dB

This parameter determines the volume of each voice. Since Envelope 3 is permanently routed to control the volume of the voice, this parameter also determines the amount by which ENV3 will affect volume.

Values above +00 dB are intended to let you compensate for the effects of heavy filtering or enveloping, and for the fact that some waves simply have less apparent loudness than others. For example, a percussion sample, which is by nature a quick peak, has less energy than a sustaining square wave. A higher VOL setting lets you raise the level of such waves to equal that of "louder" waves.

Warning:

We strongly recommend against setting high VOL levels to all the waves in your sounds just to make them louder — doing so *will* result in clipping (distorting) when you play more than one or two notes.

MODSRC

Range: various

Selects a modulation source for the output volume of the voice from among the 15 available modulators. This is in addition to ENV3, which is always routed to volume.

MODAMT

Range: -99 to +99

Determines the amount by which the assigned volume modulator will affect the output volume of the voice.

Press the **Output** button again. The display shows the second OUTPUT sub-page:



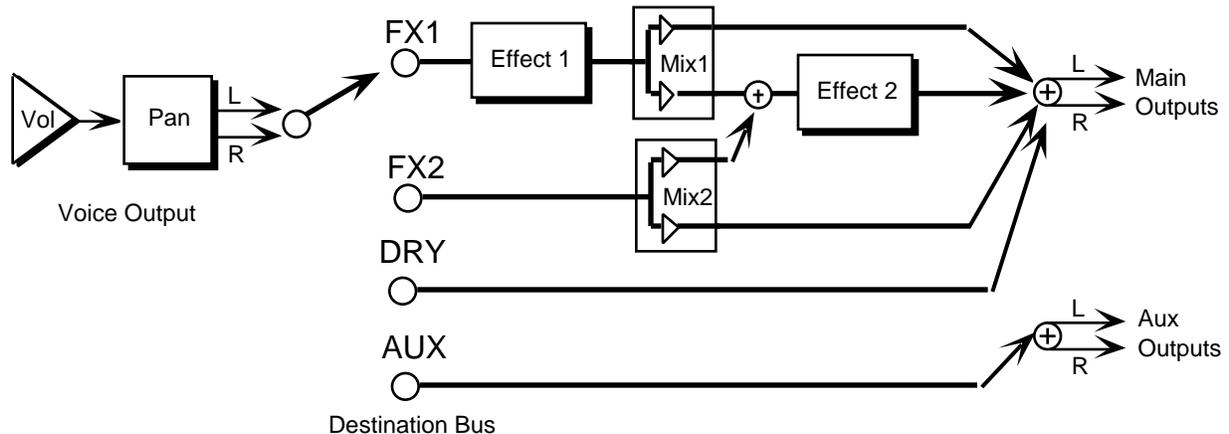
DESTINATION-BUS

Range: FX1, FX2, DRY, or AUX

Each voice within a sound can be routed to one of four stereo “busses:”

- FX1, FX2, and DRY feed the main stereo outputs of the TS-12.
- AUX sends the voice directly to the AUX Outputs. Note that voices sent to the AUX Outputs are always dry; that is, they bypass the effects processor.

The diagram below shows a common routing of the signals for each bus. See the sections on “Effects” for more on programming specific effects.

**PAN**

Range: -64 to +63

Pans the voice within the stereo field. A setting of -64 is panned hard left, and +63 is panned hard right. A value of +00 pans the voice center. The effect of a pan modulator (below) will be added to this.

MODSRC

Range: various

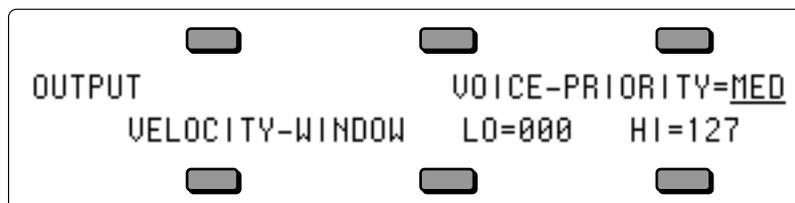
Selects a modulation source for the voice pan from among the 15 available modulators. This will cause the voice's location in the stereo field to vary with the output level of the modulation source.

MODAMT

Range: -99 to +99

Determines the amount by which the assigned volume modulator will affect the pan of the voice.

Press the **Output** button a third time. The final sub-page contains three parameters:

**VOICE-PRIORITY**

Range: LO, MED, or HI

This parameter gives you some control over how voices will be reassigned, or “stolen,” to play new notes when all of the TS-12's voices are already playing. A voice can be assigned LO, MED, or HI priority. The rule is that a given voice will only be allowed to steal from voices with the same or lower priority.

MED is the usual state and should be used for most voices. LO can be used for voices within a sound which would be missed the least if stolen (such as a voice playing the same wave as another voice but detuned a bit). HI is best used only for specific applications in which you want

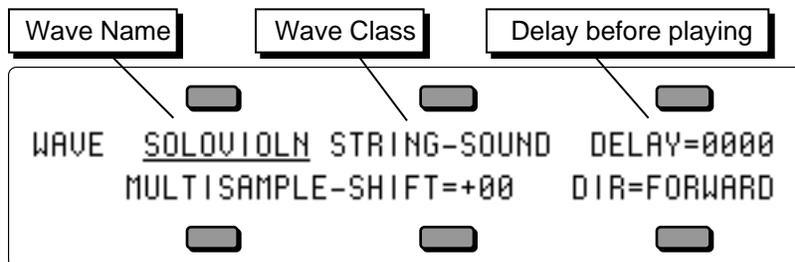
to protect a voice or voices from being stolen — such as cymbals or a sustaining “pad” sound in a sequencer track.

VELOCITY-WINDOW LO & HI Ranges: 000 to 127

The LO and HI parameters allow you to define the velocity range for each voice. The full velocity range (default) is LO=000 HI=127. By adjusting these parameters, you can set specific velocity ranges for each voice. This allows velocity switching between different voices within the program. For example, if you set a solo violin voice to LO=000 HI=064, and a string section voice to LO=064 HI=127, a soft velocity will play only the solo violin, whereas a harder velocity will play only the string section. Ranges can over-lap for velocity cross-fade effects.

Wave Page

Press the **Wave** button. On the Wave page, the same three parameters (Wave Name, Wave Type, and Delay) will always appear on the top line of the display, no matter which type of wave is selected:



Wave Name

Here you select the actual wave that the voice will play. When this parameter is underlined, the **Data Entry Slider** will select only among the waves in the current wave class. Pressing the **Up/Down Arrow** button will allow you to cross over into the next Wave Class.

Wave Class

This shows which of the 16 groups the currently selected wave is in. By underlining this parameter, you can use the **Data Entry Slider** or the **Up/Down Arrow** buttons to scroll quickly through the different wave classes to the category you want. Then underline the wave name to select a specific wave from that category.

Whenever the wave class is changed, the first wave in that class is selected, and lower-line parameters are reset to default values for the new wave class.

DELAY Range: 0000 to 5000 msec, KYUP

This parameter determines how long the voice will wait after a key is struck before playing. A delay of up to 5 seconds is possible.

When set to DELAY=KYUP (Key Up), the voice will wait until the key is released before it plays.

Class-Specific Wave Parameters

The parameters shown on the lower line of the display on the Wave page will vary depending on the current wave class. For each wave class, the lower line of the display will contain parameters controlling the features which are specific to that class.

Changing the wave class resets these parameters. However, if you scroll only one step away from the current class and then scroll back, any lower-line settings you had will be restored. Go more than one class from the current one, and any lower-line settings will be lost.

For the first thirteen wave classes, the bottom line of the display shows:

MULTISAMPLE-SHIFT

Range: -60 to +60

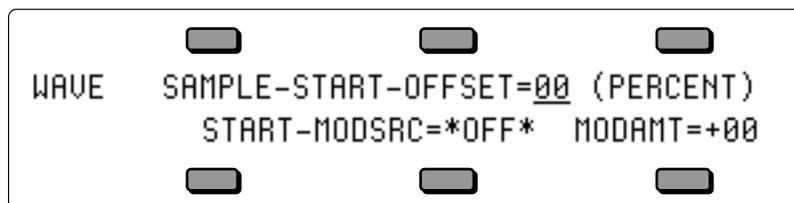
Changes keyboard split points on multi-sampled waves. This has the effect of setting the WaveSamples to ranges you wouldn't otherwise hear (allowing aliasing in some cases), creating completely different colorations. A setting of +00 is the default.

DIR

Range: FORWARD or REVERSE

Any of the waves in these wave classes can be made to play forward (which is the normal mode) or backward with this parameter. When DIR= REVERSE, the sound will play from the end of the sample to the start point, and will not loop.

Press the Wave button again to get to the next Wave sub-page:



SAMPLE-START-OFFSET

Range: 00 to 99

This controls where in the sample the wave will begin playing. When set to 00, the whole wave will play. As the start point is adjusted upwards, it will begin playing further into the wave. You can use this, for example, to skip the attack and play only the loop portion of looped (sustaining) sounds.

Note: When using the INHARMONIC and WAVEFORM Wave Classes, this parameter will change the starting phase, which is only heard when two waves are played at exactly the same pitch.

START-MODSRC

Range: various

Here you choose which of the modulators will control the sample-start of the voice. Any of the 15 modulators can be selected.

MODAMT

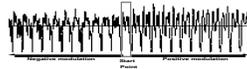
Range: -99 to +99

Determines how much the selected modulator (above) will affect the wave; i.e. how far away from the start point the sound will move. If MODAMT=+00, the sound will remain static. Positive amounts will modulate the sound forward (toward the end of the wave); negative modulation amounts will move the sound back toward the beginning.

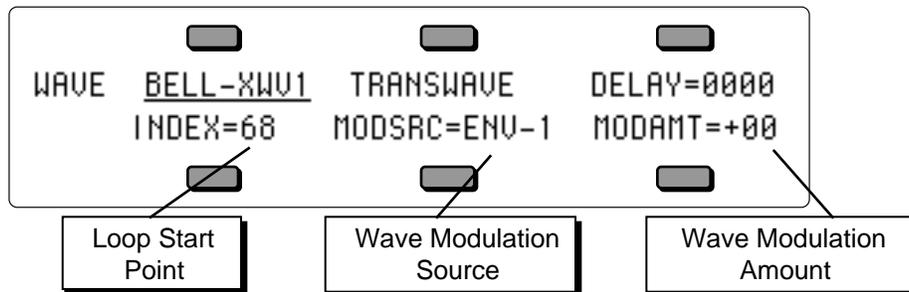
TRANSWAVE -Specific Wave Parameters

Each Transwave is actually composed of many different single-cycle waveforms, which progress from one timbre to another, occupying adjacent areas of memory. Movement within the sound is created by playing different waveforms in succession; that is, by modulating the wavetable.

The illustration below shows a typical wave of this category, with the index set in the middle range, near 50.



When the wave class is TRANSWAVE, the lower line of the display shows:



INDEX

Range: 00 to 99

The Index parameter controls where within the wavetable the voice-loop will begin playing when the key is struck.

MODSRC

Range: 00 to 99

Here you choose which of the 15 modulators will control the movement of the sound. Any of the modulators can be selected.

MODAMT

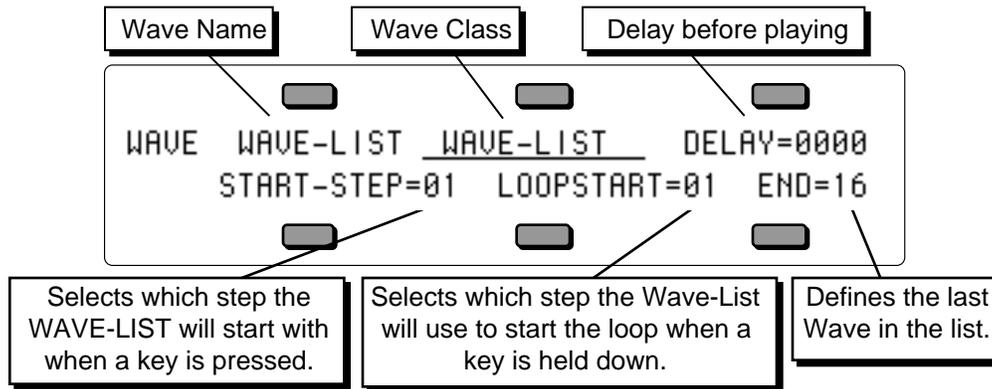
Range: -99 to +99

Determines how much the selected modulator (above) will affect the wave; i.e. how far away from the start point the sound will move. If MODAMT=+00, the sound will remain static. Positive amounts will modulate the sound forward (toward the end of the wave); negative modulation amounts will move the sound back toward the beginning.

Hyper-Wave™ -Specific Wave Parameters

Hyper-Wave architecture allows up to 16 waves to be defined in a list, which can be swept through, or cross-faded for timbre-shifting and Jam-Loops. Hyper-Waves are created by selecting WAVE-LIST with the OPTION parameter found on the Program Control page. Hyper-Waves have their own specific wave parameters.

When the Wave Class is WAVE-LIST, the display shows:



Wave Name

Range: Read only

The wave name parameter in a WAVE-LIST is meaningless and is not selectable.

Wave Class

This shows which of the 16 groups the currently selected wave is in. The WAVE-LIST category is only visible when the current sound contains a WAVE-LIST.

DELAY

Range: 0000 to 5000 msec, KYUP

Determines how long the voice will wait after a key is struck before playing. A delay of up to 5 seconds is possible.

When set to DELAY=KYUP (Key Up), the voice will wait until the key is released before it plays.

START-STEP

Range: 01 to 16

Selects which step number in the Wave-List the voice will start playing when a key is pressed.

LOOPSTART

Range: 01 to 16

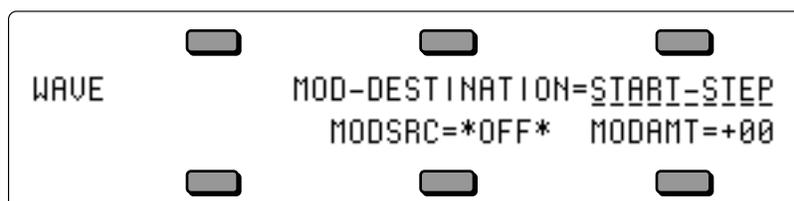
Selects the step number in the Wave-List that the voice will loop back to after playing the End Step for its duration.

END

Range: 01 to 16

Defines the last step in the Wave-List that the voice will play before looping back to play the Loop Start step.

Press the Wave button again to get to the next Hyper-Wave sub-page:



MOD-DESTINATION Range: *-NONE-*, START-STEP, LOOP-START, END-STEP, TRAVELER, or START+LOOP

- When set to START-STEP, the output level of the START-MODSRC at the time of the note-on will determine which step the Wave-List will begin playing at. A positive MODAMT will cause MODSRC output to increment the START-STEP above the manual level. A negative MODAMT will decrement the START-STEP below the manual level. The manual level is determined by the START-STEP parameter. After the appropriate START-STEP has played for its duration, the Wave-List will play through all of the successive steps, up to the END step, and then will loop back around to play the LOOPSTART Step. If the output of the MODSRC causes the Wave-List to begin playing at a Step that is past the END Step, the appropriate START-STEP will play for its duration, and then the Wave-List will loop back to play the LOOPSTART Step. The Wave-List will continue to loop between the LOOPSTART Step and the END Step, until the voice is turned off.
- When set to either LOOP-START or END-STEP, the LOOPSTART Step or the END Step values will be modulated in a non-real-time manner, similar to when MOD-DESTINATION=START-STEP. With either setting, if the output of the MODSRC causes the END Step to be lower than the LOOPSTART Step, the Wave-List will simply repeat the LOOPSTART Step.
- When set to TRAVELER, Step Duration will be ignored, and MODSRC output will directly control which Step will play, within the boundaries of the START-STEP and the END Step, continuously, in real-time. With MODSRC output at zero, a positive MODAMT will cause the Wave-List to play only the START-STEP. With MODSRC output at full, a positive MODAMT will cause the Wave-List to play only the END Step. A negative MODAMT will have the opposite effects.
- When set to START+LOOP, the MODSRC will modulate the START-STEP, LOOPSTART Step and END Step values all simultaneously, relative to one another, and all in a real-time manner similar to when MOD-DESTINATION=TRAVELER. The integrity of the loop will be maintained as the Step values are modulated. START+LOOP allows you to move a fixed-length window over a definable range of the Wave-List.

MODSRC Range: 00 to 99
Here you choose which of the 15 modulators will control the movement of the wave-list. Any of the modulators can be selected.

MODAMT Range: -15 to +15
This parameter determines the number of steps that the selected Mod Destination will be modulated. Modulation can be either positive or negative.

Drum-Map Specific Wave Parameters

A Drum-Map can use up to 64 waves per program, four waves per key, with separate pitch, volume, panning and voice template parameters for each wave. All of the DRUM-MAP wave page parameters are identical to the first thirteen wave classes, with the exclusion of the MULTISAMPLE-SHIFT parameter.

Also, the DRUM-MAP Wave Class category is only visible when the current program contains a Drum-Map. The wave name parameter in a Drum-Map is meaningless and is not selectable.

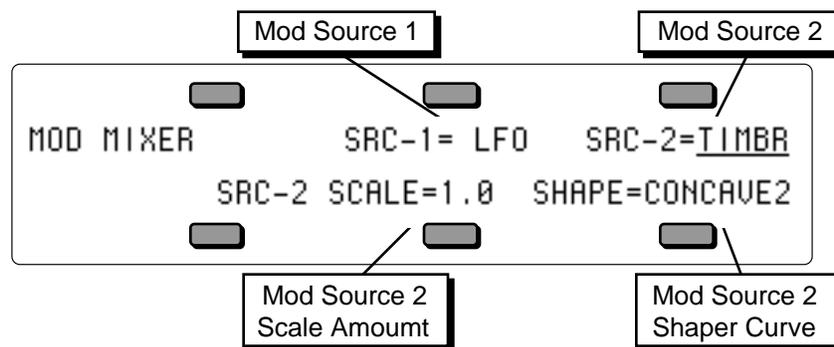
Note: When a Program contains a Drum-Map, the OCTAVE and SEMITONE values on the PITCH page will have no effect on the Drum-Map. You can still use pitch modulation to obtain more drastic pitch shifts than are possible within the PITCH parameter in the Drum-Map Editor.

Mod Mixer Page

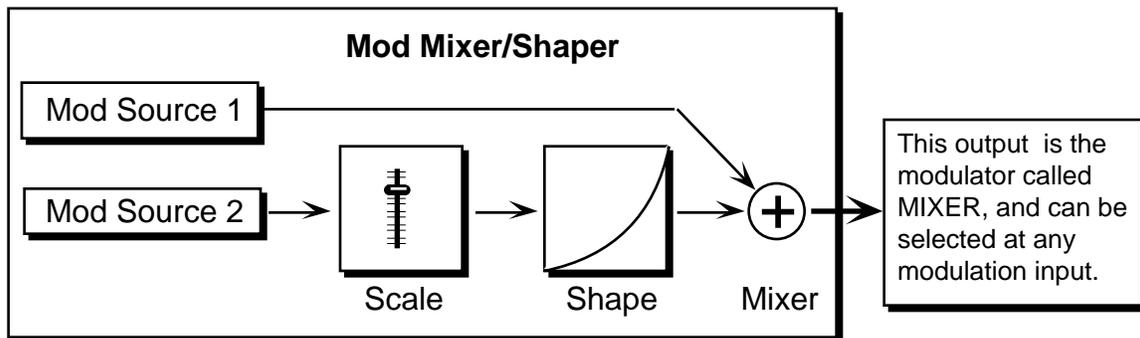
The Mod Mixer is a unique feature which allows you to:

- combine and assign two modulators to a single modulation input
- scale and/or shape the response of one of those modulators according to one of 16 Mod Shaper Curves

Select the voice you want to edit on the Select Voice page, and then press **Mod Mixer**. The display shows:



The two parameters on the top line of the display select the two modulators which will be mixed together, SRC-1 and SRC-2. On the lower line of the display are two parameters for shaping the level and response of SRC-2. Internally, the Mixer/Shaper works like this:



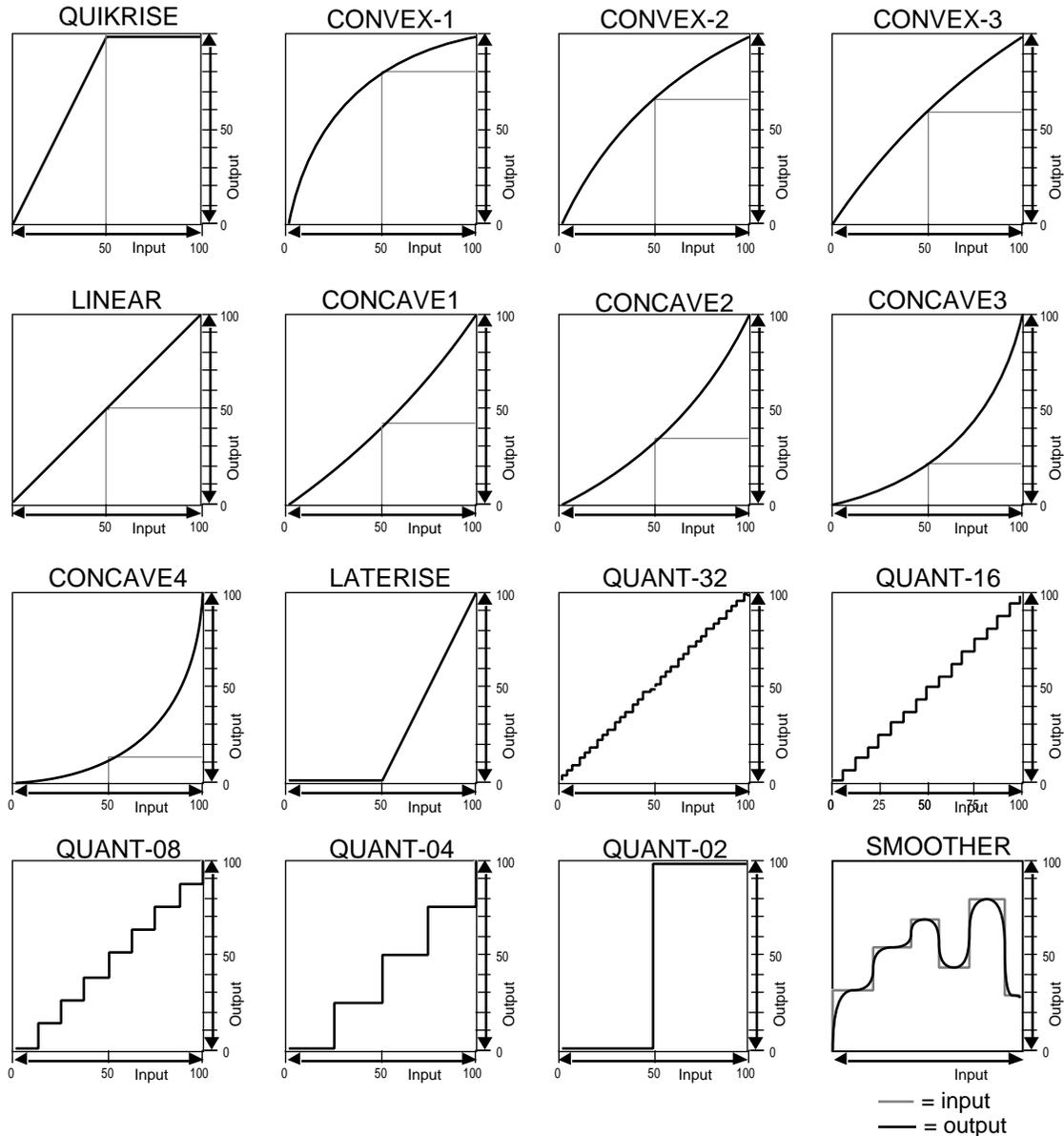
There are four parameters which can be selected on the Mod/Mixer page:

- SRC-1** Range: various
 Select any of the 15 available modulators (including the mixer itself) as Mod Source 1. SRC-1 is sent directly to the mod mixer without any level change or response shaping.
- SRC-2** Range: various
 Select one of the 15 available modulators as Mod Source 2. Before being added to SRC-1, SRC-2's level is adjusted by a scale factor, and then it is passed through the shaper, which allows its response to be customized in a number of interesting ways.
- SRC-2 SCALE** Range: various from 0.1 to 8.0
 This is used to adjust the level of SRC-2 relative to SRC-1, or to simply scale the level of the modulator for effect. The modulator's level is *multiplied* by the number shown. A value of 1.0 leaves the modulator at its original level. Fractional values (0.1 to 0.9) will reduce the level. Values greater than 1.0 will amplify the effect of the modulator, in most cases simply causing it to reach full level much sooner.

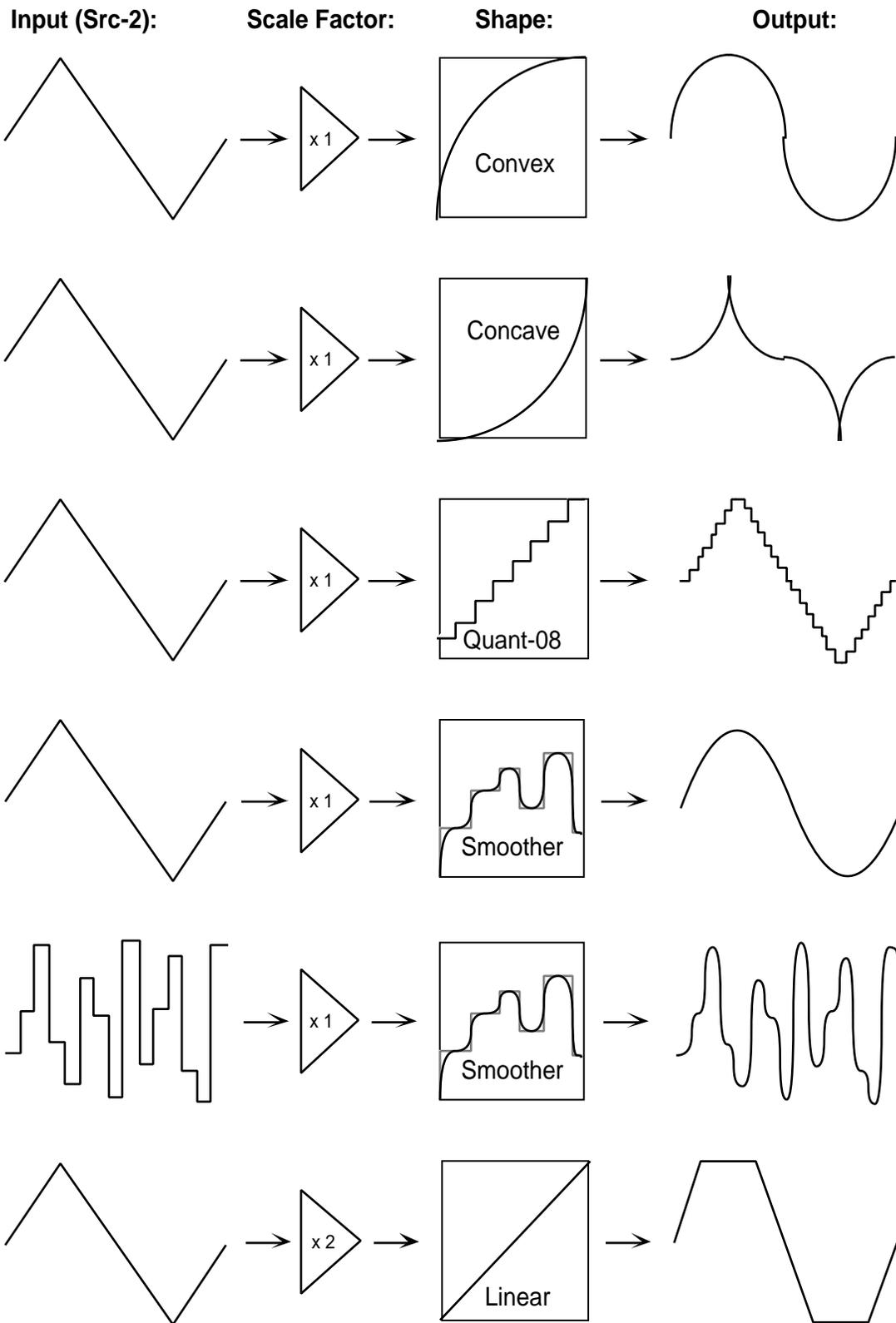
SHAPE

Range: various

Here you select which of the 16 tracking curves will be applied to the modulator selected as SRC-2. You can use one of the convex or concave shapes to make the modulator's effect come in earlier or later than it ordinarily would; you can use one of the quantized shapes to make the modulator's effect sound "stepped"; or you can use the smoother (which is similar to a "lag processor" in some older analog synths) to smooth the effect of the modulator, to round off the edges. The diagram below shows the 16 Shaper tracking curves:



Some possible applications for shaping the response of SRC-2 are shown on the following page.



Program Control Page

The parameters on this page control aspects of the program that affect all of the individual voices within the program. Press **Program Control**. The display shows:



Type

Range: various

Allows you to define a sound class for your sound. This setting can be used by third-party editor librarian software for “automatic-sorting” of sounds by type. The available types are:

- ACPIANOS Acoustic pianos, honky-tonk, toy pianos, and piano forte
- ELPIANOS Electric and electronic piano sounds
- ORGANS Pipe organs, electric, and electronic organs
- ALTKEYS Other keyboard sounds such as harpsichord, accordion, and piano layered with other sounds
- SYNLEAD Lead synth sounds
- SYNPAD Sustaining synth pads
- SYNOTHER Other synth sounds: hybrids, fat power-synths, synth bells
- GUITARS Acoustic guitars, clean electric guitars and distortion guitars
- ALTPLUCK Other plucked strings: harps, banjo, dulcimer, sitar, etc.
- SOLOSTRG Plucked and bowed solo strings (violin, viola, cello, bass)
- STRGSECT Plucked and bowed string sections and small ensembles
- SOLOBRAS Solo brass: trumpet, trombone, tuba, French horns
- BRASSECT Brass sections: trumpet, trombone, tuba, French horns
- SOLOSAX Solo saxophones
- SOLOWIND Solo woodwinds/reeds (including harmonica)
- WINDSECT Woodwind/reed/saxophone sections and small ensembles
- VOCALS Vocal sounds: choirs and synth-vox
- ACOUBASS Acoustic basses
- ELECBASS Electric basses
- SYNBASS Synth basses
- DRUMS-E Drum kits that use the ENSONIQ Drum Map
- DRUMS-GM Drum kits that use the General MIDI Drum Map
- PERCUSSN Percussion kits and solo untuned percussion (e.g. taiko)
- TUNEPERC Tuned percussion: marimba, xylophone, timpani, orchestral hits
- SOUND-FX Realistic (e.g. broken glass) and fantasy (e.g. spacecraft) sound effects
- SPLITS Combination keyboard splits of 2 or more different sounds
- TRANS-WV Distinctly TransWave-type sounds
- HYPER-WV Distinctly HyperWave texture sounds
- GROOVES Rhythm loop groove patterns and pulsed performance sounds
- UTILITY Utility resources: default template sounds, pitch tables, etc.
- OTHER Unclassified miscellaneous sounds (e.g. didgeridoo), and unnatural acoustic layers (e.g. violin scrape layered with a shakuhachi)
- CUSTOM Use this to define your own special purpose sound type: ENSONIQ sounds will never be released with TYPE=CUSTOM.

Tip: With the SoundFinder feature, when a sound name is selected, pressing the **Replace Track Sound** button and then continued presses of the **Up** or **Down Arrow** buttons will scroll through all sounds in memory that are assigned the same TYPE.

OPTION Range: *-NONE-*, PITCH-TBL, WAVELIST, or DRUM-MAP

The setting of this parameter indicates whether a Custom Pitch-Table, a Wave-List, or a Drum-Map exists within the sound. These options occupy the portion of a sound program which is usually used by voices 5 and 6, so when an Option is present, you do not have access to those two voices. Whenever the setting of this parameter is changed, you will be prompted with the question "REPLACE VOICES 5+6 WITH PITCH-TABLE, WAVE-LIST, DRUM-MAP, or *EXIT*." If you choose *EXIT*, then the setting of the parameter is *not* changed.

If you have a program where OPTION=PITCH-TBL, DRUM-MAP, or WAVELIST, and you want to *eliminate* the Option (to gain back Voices 5 and 6), press the **Down Arrow** button when this parameter is selected. The display will show ERASE CURRENT <PITCH-TABLE, DRUM-MAP, or WAVE-LIST>? Selecting *YES* will eliminate the Option, and restore Voices 5 and 6 to their default settings.

If you have a program where OPTION=<PITCH-TBL, DRUM-MAP, or WAVELIST>, and you want to *change* the Option (to another option), press the **Up Arrow** button when this parameter is selected. The display will show the prompt REPLACE VOICES 5+6 WITH PITCH-TABLE, WAVE-LIST, DRUM-MAP, or *EXIT*. At this point, you can select a new Option, or press *EXIT* to return to the previously selected Option assigned to the program.

PRESS Range: OFF, KEY, or CHAN

Allows you to select Poly-Key, Channel, or no pressure for the program. Generally, if a program doesn't need to respond to pressure, set this to OFF to conserve sequencer memory. This is the default setting that will be installed into a track when the program is selected.

PATCH Range: LIVE or HELD

Selects the default patch select mode for the program. When set to LIVE, it uses the current state of the buttons to select a patch. When set to HELD, it uses the patch set by the first key hit while touching the patch select buttons. For more information about patch selects, refer to Sections 4 and 5. This is the default setting that will be installed into a track when the program is selected.

RESTRIKE Range: 00 to 99

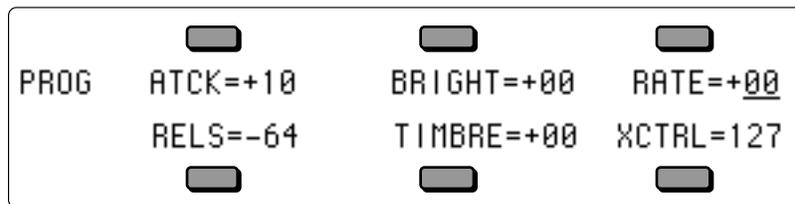
This parameter controls the voice Restrike time. When you play a particular note and then restrike it again immediately before the old note has finished sounding, the amount of time it takes for the first strike to fadeout is determined by this parameter. By varying the setting of this parameter, you can control how long sounds overlap when a note is restruck.

For example, if you have a slow string sound, it may sound more natural to use a longer restrike value, which will cause the old note to decay more slowly, rather than end abruptly when the new note starts. Normal values are around 10. The higher the value, the longer the fadeout time.

Tip: If you hear clicking sounds when you restrike a note, setting the Restrike time to higher values may eliminate the click.

Along with the PRESS and PATCH parameters, the next page contains copies of track parameters that are saved in the program. When a program is selected or put on a track, values of these parameters (as saved in the program) are installed in the track as the default initial settings. They can be edited on the track pages without affecting the program default settings, but must be edited on this page in order to be saved with the program. Changes made here will be copied to the current primary track.

Press the **Program Control** button again to get to the second sub-page:



The following parameters are the default settings for the Track parameters that are stored with the Program. For more information about how these parameters function, see *Section 5 — Preset/Track Parameters*.

ATCK Range: -64 to +63
 Editing the ATCK parameter default values will simultaneously edit the Track ATTACK Parameter values on the track that the sound is occupying. This parameter will only function if an asterisk is assigned to any ATTACK parameter (found on the ENV1, 2, and 3 pages) for any Voice in the selected program. This is the default setting that will be installed into a track when the program is selected.

BRIGHT Range: -64 to +63
 Editing the BRIGHT parameter default values will simultaneously edit the Track BRIGHTNESS Parameter values on the track that the Program is occupying. This parameter will only function if an asterisk is assigned to any filter cutoff parameter (found on the Filters page) for any Voice in the selected program. This is the default setting that will be installed into a track when the program is selected.

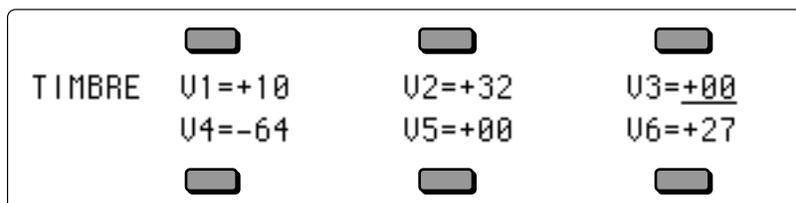
RATE Range: -64 to +63
 Editing the RATE parameter default values will simultaneously edit the Track RATE Parameter values on the track that the Program is occupying. This parameter will only function if an asterisk is assigned to any LFO RATE parameter (found on the LFO page) for any Voice in the selected program, or if the program contains a voice that plays a Wave-List. This is the default setting that will be installed into a track when the program is selected.

RELS Range: -64 to +63
 Editing the RELS parameter default values will simultaneously edit the Track RELEASE Parameter values on the track that the Program is occupying. This parameter will only function if an asterisk is assigned to any RELEASE parameter (found on the ENV1, 2, and 3 pages) for any Voice in the selected program. This is the default setting that will be installed into a track when the program is selected.

TIMBRE Range: 000 to 127
 Editing the TIMBRE parameter default values will simultaneously edit the Track TIMBRE Parameter values on the track that the Program is occupying. This parameter will only function if TIMBRE is assigned as a modulator within the selected program, or if the V1 through V6 relative volume modulation amounts on the third Program Control sub-page have been assigned to values other than zero. This is the default setting that will be installed into a track when the program is selected.

XCTRL Range: 000 to 127
 Editing the XCTRL parameter default values will simultaneously edit the Track XCTRL Parameter values on the track that the Program is occupying. This parameter will only function if XCTRL has been assigned as a modulator within the selected program. This is the default setting that will be installed into a track when the program is selected.

Press **Program Control** again to get to the third sub-page:



TIMBRE V1 to V6

Ranges: -64 to +63

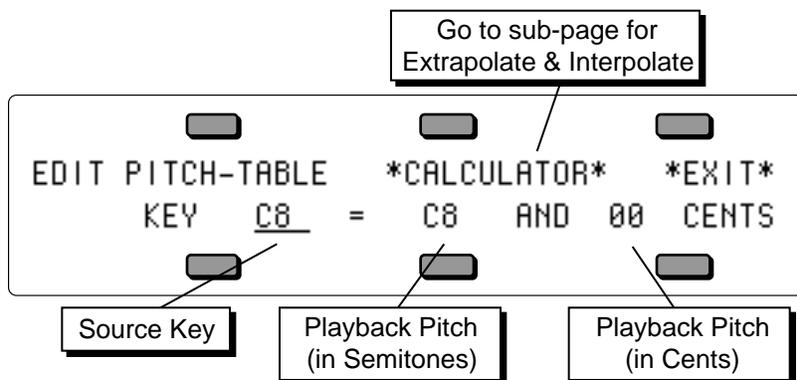
The TIMBRE sub-page controls the *relative* volume modulation amounts for each Voice, as controlled by Timbre. Note that when OPTIONS is set to PITCH-TABLE, WAVE-LIST, DRUM-MAP, the V5 and V6 parameters are not displayed.

Pitch-Table Editor Parameters

The following parameters are only available when OPTION=PITCH-TABLE on the first Program Control Page. To access the Pitch-Table Editor parameters:

- 1) Press the **Program Control** button.
- 2) Select the OPTIONS parameter by pressing its soft button.
- 3) Press the **Up Arrow** button.
- 4) Select PITCH-TABLE on the bottom of the display by pressing its soft button.
- 5) Press either of the soft buttons beneath EDIT PITCH-TABLE.

The Pitch-Table Editor parameters are:



CALCULATOR

This parameter selects the Extrapolate/Interpolate sub-page, allowing you to create a pitch-table calculated from a user-defined key range.

KEY Source Key

Range: A0 to C8

For every Source Key on the lower left, you can see and edit the pitch of that key. The Source Key can be selected by pressing the keys, or using the Data Entry Controls.

Playback Pitch

Range: A0 to C8

The source key can be thought of as the physical location of the key on the keyboard. The playback pitch can be the same as the source key — as shown in the display — or it can be any pitch from A0 to C8.

Fine Tune Parameter

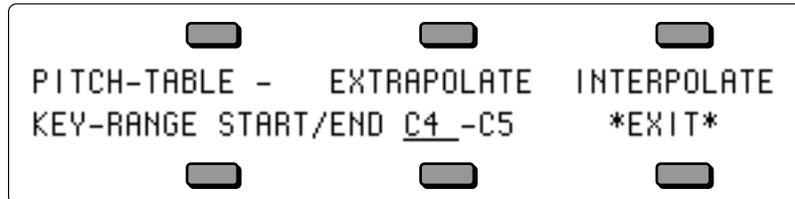
Range: 00 to 99 cents

Enables you to fine tune the pitch, or create micro-tunings and other alternate tunings.

EXIT

- Press *EXIT* to return to the first Program Control sub-page, eliminating any edits you may have made on the Pitch-Table Editor sub-page.

To display the Extrapolate/Interpolate sub-page, press the *CALCULATOR* soft button. The display shows:

**KEY-RANGE START/END**

Ranges: A0 to C8

Defines the area of the keyboard that the TS-12 will use as a reference by which to make its calculations. The START key is the first of the two key numbers shown, and the END key is the second number shown. By selecting a start and stop key, you can define the key range whose pitch intervals will be duplicated over the entire keyboard. Note that you can also set the start and end keys using the data entry controls, and press the soft button beneath them to toggle back and forth.

EXTRAPOLATE

The EXTRAPOLATE command takes the pitch-table relationships from within a key range and duplicates those relationships outside that range.

After a key-range has been defined, press the EXTRAPOLATE soft button. The display briefly reads PITCH-TABLE *CALCULATOR*, then returns with the newly defined range across the whole keyboard.

INTERPOLATE

INTERPOLATE takes the interval between two notes on the keyboard and divides all the keys in between into equally-spaced fractions of that interval.

After a key-range has been defined, press the INTERPOLATE soft button. The display briefly reads PITCH-TABLE *CALCULATOR*, then returns with the newly defined range across the whole keyboard.

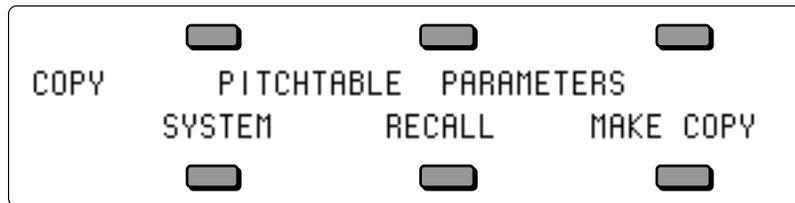
- Press *EXIT* to return to the first Edit Pitch-Table sub-page, eliminating any edits you may have made on the Extrapolate/Interpolate sub-page.

Warning:

You must save the program containing your custom pitch-table, or copy the custom pitch-table into the system, or you will lose it as soon as you edit another sound.

Copy Pitch-Table Parameters

Pressing **Copy** from the Edit Pitch-Table sub-page will display the Copy page:



The **MAKE COPY** parameter allows you to make a copy of the complete pitch-table from the currently selected program (or the Compare Buffer) into the Copy Buffer.

The **RECALL** parameter allows you to recall the complete pitch-table from the Copy Buffer into an edited version of the current program if 1) the current program has a pitch-table installed in it and 2) the Copy buffer contains a pitch-table. If you attempt to recall a Pitch-Table into a program without just previously having copied a pitch-table into the Copy buffer, the copy is not completed and an error message is displayed.

The **SYSTEM** parameter allows you to install an alternate tuning into the System pitch-table. As an added feature, the System pitch-table itself is user-definable. For instance, if you want to hear what other programs sound like using the custom pitch-table from a program, you can redefine the System pitch-table. Or, if your main tuning is “just intonation,” then it might be convenient for you to use this or some other alternate tuning as your System tuning.

- Press the soft button beneath **SYSTEM**. The display briefly reads **COPY TO SYSTEM PITCH-TABLE**, and the custom pitch-table is installed into the TS-12 Operating System where it is available for use by any program.
- Press **System** four times to view the System **PITCH-TABLE** sub-page.



- Note that the **SYSTEM PITCH-TABLE** parameter has been set to **CUSTOM**. Now all programs whose voices are set to use the system pitch-table (which is most programs) will use the custom pitch-table.

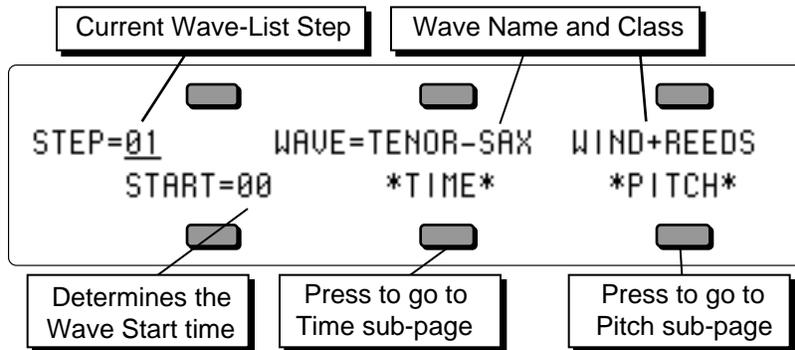
To return all programs to standard equi-tempered tuning, set the System **PITCH-TABLE** parameter back to **NORMAL**. Switching back to **CUSTOM** will restore your custom System pitch-table. You can switch back and forth as often as you wish. You can also try installing other custom pitch-tables in the System, but the System pitch-table can only contain one Custom pitch-table at a time.

Wave-List Editor Parameters

The following parameters are only available when OPTION=WAVE-LIST on the Program Control Page. To access the Wave-List Editor parameters for a program that does not contain a Wave-List:

- 1) Press the **Program Control** button.
- 2) Select the **OPTIONS** parameter by pressing its soft button.
- 3) Press the **Up Arrow** button.
- 4) Select **WAVE-LIST** on the bottom of the display by pressing its soft button.
- 5) Press either of the soft buttons beneath **EDIT WAVE-LIST**.

The Wave-List Editor parameters are:

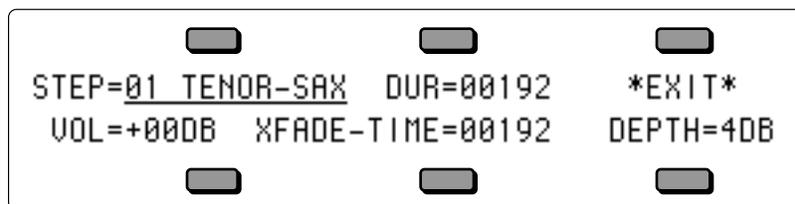


STEP Range: 01 to 16
 Defines which of the 16 steps within the Wave-List will be edited.

Wave Name and Class Range: All ROM waves
 Defines which of the internal ROM waves will be used in the currently selected step.

START Range: 00 to 99
 Determines the starting point *within* the internal ROM wave. This can be used to eliminate the attack portion of a wave to create a smoother transition between waves.

TIME
 Pressing this soft button will reveal the following screen:



STEP Range: 01 to 16
 Selects the wave step to be edited, followed by the Wave Name for the current Step (read-only).

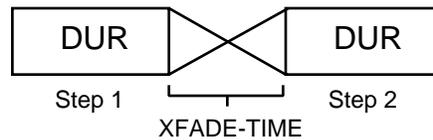
DUR Range: 00000 to 60000 (0 to 60 sec)
 Selects the total length of time that the selected wave step will play. The duration is defined in 12 millisecond increments.

VOL Range: -50 to +14 dB
 Sets the volume for the selected wave step.

XFADE-TIME

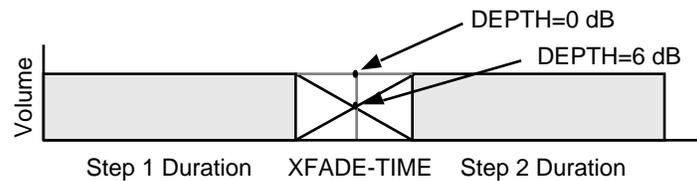
Range: 00000 to 60000 (0 to 60 sec)

Sets the amount of time that the selected wave step will cross-fade into the following wave step. The XFADE-TIME adds time to the duration of both the current step and the next step:

**DEPTH**

Range: 0 to 6 dB

Determines how many decibels (dB0 below normal volume the two wave steps will meet at the center point of the cross-fade curve.

***EXIT***

Pressing *EXIT* will return you to the Wave-List Editor page.

PITCH

Pressing this soft button will reveal the following screen:

**STEP**

Range: 01 to 16

Selects the wave step to be edited, followed by the Wave Name for the current Step (read-only).

DIR

Range: FORWARD or REVERSE

Sets the direction of the wave step.

PITCH-KBD-TRK

Range: OFF or ON

This determines whether the wave step will use the currently selected System pitch-table (when ON), or play the same pitch for every key (when OFF).

XPOS

Range: -36 to +36 (in semitones)

Determines the pitch of the wave step.

DETUNE

Range: -99 to +99 (in cents)

Allows you to fine-tune the wave step.

EXIT

Pressing *EXIT* will return you to the Wave-List Editor page.

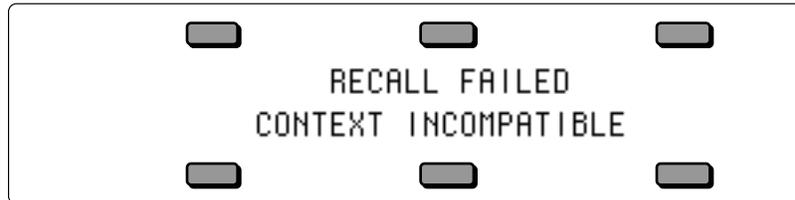
Copy Wave-List Parameters

Pressing **Copy** from the Edit Wave-List sub-page will display the Copy page:



The **MAKE COPY** parameter allows you to make a copy of the complete Wave-List from the currently selected program (or the Compare Buffer) into the Copy Buffer.

The **RECALL** parameter allows you to recall the complete Wave-List from the Copy Buffer into an edited version of the current program if 1) the current program has a Wave-List installed in it and 2) the Copy buffer contains a Wave-List. If you attempt to recall a Wave-List into a program without just previously having copied a Wave-List into the Copy buffer, the copy is not completed and the following message is displayed:

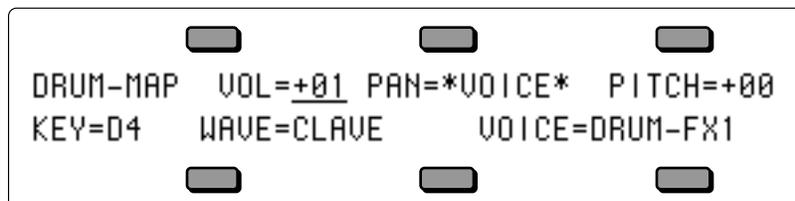


Drum-Map Editor Parameters

The following parameters are only available when **OPTION=DRUM-MAP** on the Program Control Page. To access the Drum-Map Editor parameters:

- 1) Press the **Program Control** button.
- 2) Select the **OPTIONS** parameter by pressing its soft button.
- 3) Press the **Up Arrow** button.
- 4) Select **DRUM-MAP** on the bottom of the display by pressing its soft button.
- 5) Press either of the soft buttons beneath **EDIT DRUM-MAP**.

The Drum-Map Editor parameters are:



VOL

Range: +00 to +15 in incremental steps

Controls the volume level of the sound(s) played by this key *relative* to the other keys in the drum-map. Setting this parameter to 00 does not necessarily silence the voice(s) playing the wave, and the actual volume minimum depends on the base volume level of the original waveform.

PAN

Range: various

Determines where the drum wave voice will be panned in the stereo mix. The values for the

PAN parameter are:

VOICE	Uses Patch VOICE panning
L- - - - -	Hard Left
- L- - - - -	Medium Left
-- L- - - -	Soft Left
--- C- - -	Center
---- R- -	Soft Right
----- R-	Medium Right
----- R	Hard Right

Note: When PAN=*VOICE*, the key uses whatever pan setting is chosen on the Output page of the voice(s) responding to the key. All of the other PAN settings override the pan setting on the Output page.

PITCH Range: -16 to +15 semitones

The pitch of the selected wave can be raised or lowered in semitone steps. If a greater range or precision of tuning is required, then it is necessary to use pitch modulation on the Pitch Mods page in the destination voice(s).

KEY Range: B1 to B6

This parameter selects a single key for editing and displays all of the current drum-map parameter settings for that key. When this parameter is underlined, you can select the drum-map key to be edited using the data entry controls or by playing the keys on the keyboard. If you play several keys together, the last one played will be selected. There are 61 possible keys in a drum-map, ranging from B1 to D7 (MIDI keys 35 to 95). This range is based on the General MID Spec.

WAVE Range: (shown below)

This parameter allows you to select the wave to be played by the key from any of the internal ROM waves. Drum-maps will have access to all Waves in the following Wave Classes, for a total of 105 different selectable wave forms:

- DRUM-SOUND
- CYMBALS
- PERCUSSION
- TUNED-PERCUS
- SOUND-EFFECT

Setting WAVE=*MUTED-* (Data Entry Slider all the way down) will prevent the current key of the drum-map from playing any voice(s). This could be useful in sequencing, when you want to start recording with a drum track, but don't want the drum to play on the first beat of the first measure.

VOICE — Voice Parameter Template Range: (shown below)

This parameter specifies where the current voice will be sent. For the four Patch Select settings, the destination voices are within the current program and the number of *active* voices is determined by the mute status of the four voices within the specified patch.

If the VOICE parameter is assigned to a patch which does not have any voices set to wave type DRUM-MAP, then the display will show WAVE=*-VOICE-* and the parameter will not be editable. This indicates that the wave played by the key is controlled by the voice(s) in the patch rather than by the Drum-Map.

for this setting: the selected key is assigned to:

00 PATCH	Voice will play, along with any other voice(s) assigned to Patch Select 00
0* PATCH	Voice will play, along with any other voice(s) assigned to Patch Select 0*
*0 PATCH	Voice will play, along with any other voice(s) assigned to Patch Select *0
** PATCH	Voice will play, along with any other voice(s) assigned to Patch Select **
DRUM-FX1	This basic medium drum/perc. envelope, routed to FX-1, lets most drum

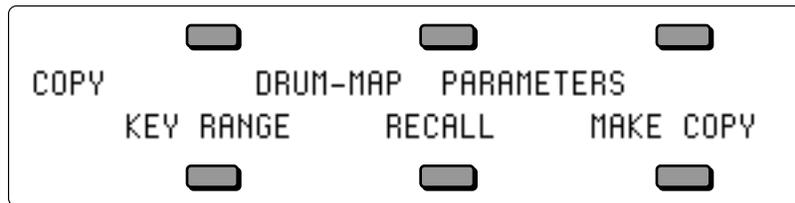
	sounds through unchanged, but then closes down to create a gate-type effect. Can be used for almost all unlooped drums & percussion. To create a percussion decay out of a looped sound, you should use the LDECAY, MDECAY or SDECAY voices described below.
DRUM-FX2	Same as above, routed to FX-2
DRUM-DRY	Same as above, routed to DRY
TIGHT-FX1	Very quick decay drum/perc. env., routed to FX-1. Good for transients, muted or “choked” sounds. Turns an ambient drum wave into a tight one.
TIGHT-FX2	Same as above, routed to FX-2
TIGHT-DRY	Same as above, routed to DRY
NORMAL-FX1	A normal mode env. for controlling the duration of the sound (sound plays as long as the key is held, rather than always finishing its decay). Can be used for snare roll, guiro, or other sustaining waves where you would want to vary the duration.
NORMAL-FX2	Same as above, routed to FX-2
NORMAL-DRY	Same as above, routed to DRY
TOMTOM-FX1	Slight downward pitch envelope, volume and filter shapes optimized for toms, routed to FX-1. Can be used for toms, congas, tablas, anything that wants a subtle pitch env. and drum decay. Pressure bends the pitch down further. (For more radical pitch effects, use SYNDRM default below.)
TOMTOM-FX2	Same as above, routed to FX-2
TOMTOM-DRY	Same as above, routed to DRY
KEYGRP-FX1	Trigger mode voice, optimized for hi-hats. This allows group voice cutoff, and can be used for hi-hat key group.
KEYGRP-FX2	Same as above, routed to FX-2
KEYGRP-DRY	Same as above, routed to DRY
LDECAY-FX1	Long cymbal/percussion decay, routed to FX-1. Can be used for crash cymbals, rides, various long-decay percussion sounds.
LDECAY-FX2	Same as above, routed to FX-2
LDECAY-DRY	Same as above, routed to DRY
MDECAY-FX1	Medium cymbal/percussion decay, routed to FX-1. Good used for china cymbal, medium crash, and other medium-decay percussion sounds.
MDECAY-FX2	Same as above, routed to FX-2
MDECAY-DRY	Same as above, routed to DRY
SDECAY-FX1	Short cymbal/percussion decay, routed to FX-1. Good for splash cymbals and other, shorter-decay percussion sounds.
SDECAY-FX2	Same as above, routed to FX-2
SDECAY-DRY	Same as above, routed to DRY
SYNDRM-FX1	Exaggerated pitch and filter envelopes, good for processing synth drums, or creating special effects with regular drums.
SYNDRM-FX2	Same as above, routed to FX-2
SYNDRM-DRY	Same as above, routed to DRY
DRUM-AUX	The envelope is the same as DRUM-FX1, but the voice is routed to AUX. This special default routes the basic drum/perc. voice to the AUX outputs.

Tip: By assigning one of the PATCH settings to the drum-map VOICE parameter and setting the WAVE parameter to *-MUTED-*, you can use any internal ROM voice to play for that assigned key. Just make sure that the internal ROM wave is assigned to one of the remaining voices (on the Select Voice page) and that it is active in the defined patch select setting.

Press the **Program Control** button to exit the Drum-Map Editor.

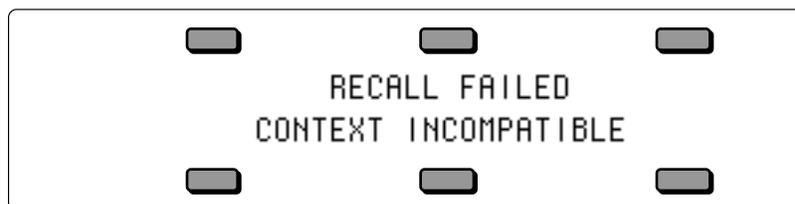
Copy Drum-Map Parameters

Pressing **Copy** from the Drum-Map Editor page will display the Copy page:



The **MAKE COPY** option allows you to make a copy of the complete Drum-Map from the currently selected program (or the Compare Buffer) into the Copy Buffer.

The **RECALL** option allows you to recall the complete Drum-Map from the Copy Buffer into an edited version of the current program if 1) the current program has a Drum-Map installed in it and 2) the Copy buffer contains a Drum-Map. If you attempt to recall a Drum-Map into a program without just previously having copied a Drum-Map into the Copy buffer, the copy is not completed and the following message is displayed:



Selecting the **KEY RANGE** option will display another page which allows you to fill a range of keys with copies of the currently selected Drum-Map key (the key that was shown on the Drum-Map Editor page when you pressed **Copy**).



KEY-RANGE START / END

Ranges: B1 to B6

Allows you to specify the range of keys in the drum-map to be filled by playing the lowest and then highest key of the range. You can also edit these parameters using the **Data Entry Slider** or the **Up/Down Arrow** buttons. Press the soft button to select between the Start and End key fields.

Selecting ***COPY*** will complete the command and will show **COPY DONE** before returning to the Copy page.

Selecting ***EXIT*** will simply return the Copy page without affecting the Drum-Map.

Program Effects Page

Understanding the effect algorithms and their related parameters are described in detail in *Section 6 — Understanding Effects* and *Section 7 — Effect Parameters*.

Select Voice Page

The Select Voice page is used to view the six voices that create a program sound. Note that if there is a Drum-Map, Wave-List, or Pitch-Table within the program, the Select Voice page will only show four voices (a Drum-Map, Wave-List, or Pitch-Table replaces voices 5 and 6).

Continued presses of the **Select Voice** button will toggle between the Select Voice page and the page you were on prior to entering the Select Voice Page.

Copy Page

The Copy page is context sensitive— depending on what was last selected, it can be used to copy:

- All LFO Parameters
- Envelope-1, 2, and 3 Parameters
- Pitch Page Parameters
- Pitch Mod Parameters
- Filter-1 and 2 Parameters
- All Output Parameters
- Wave Page Parameters
- Mod Mixer Parameters
- Program Parameters
- Pitchtable Parameters
- Drum-Map Parameters
- Effects Parameters
- All Voice Parameters

For more information on using the Copy page, refer to the previous section.

Write Program Page

Pressing the **Write Program** button will allow you to edit the name of the currently selected program, and write it into a User RAM location. After you've written your program name (using the left/right cursor buttons and the data entry controls), press and hold the **Sounds** button, and select a BankSet, and Bank location for your edited program. When you've decided on a location, while still holding down the **Sounds** button, press the soft button above/below where you want to load the newly edited program. The display quickly shows WRITING PROGRAM, and then shows the newly edited program in that location.

Compare Function

The Compare button is used to compare the newly edited sound with the original sound. This allows you to audition your changes before saving them. When the LED is lit, you are hearing the edited sound. When the LED is OFF, you are hearing the original sound. Continued presses of the **Compare** button will toggle between the edited and the original version of a sound program.

The Compare function will not work with Sampled Sounds.

Section 10 — Understanding the Sequencer

This section contains an introduction to the TS-12 sequencer and all the information you'll need to get started sequencing. More detailed descriptions of the actual parameters are covered in the following section. *Section 12 — Sequencing/MIDI Applications* explains some typical uses of the TS-12 sequencer.

Introduction

The TS-12, with its 24-track sequencer, incorporates a range of features and capabilities you would expect to find in stand-alone or computer sequencers, yet with the advantage of an integrated system. The TS-12 is both powerful and easy to use — having your synthesizer, sequencer and master keyboard controller right at your fingertips in one unit is what makes the ENSONIQ approach to digital sequencing so intuitive and efficient.

If you can't wait to start sequencing, you can turn right to "Recording a Sequence" later in this section. We recommend, however, that you come back and familiarize yourself with the many other sequencer controls and functions described in this section. This is the only way to truly take advantage of the power of the TS-12 sequencer.

Digital Sequencing

Now imagine a recorder which, instead of recording the sounds of an instrument, records the same kind of digital information that is sent and received over MIDI — key down, key up, key number and velocity, pitch bend, mod wheel, program changes and so on — and you have imagined a *digital sequencer*.

A sequencer records and plays back the "control information" rather than the actual notes. This means that there is no degradation of the sound in the recording process no matter how many times you overdub or re-record a part. A sequencer is sort of like an electronic player piano.

It is important to bear in mind that a sequencer only records what you play. Sequencer memory is used up on the basis of *Events* (keys struck, controllers, etc.), while a tape recorder's memory (the tape) is always used up by the same amount over a fixed period of time. In other words, a digital sequencer will use virtually the same amount of memory to record 100 notes, whether you play those notes over ten seconds or ten minutes.

When you strike a key, the sequencer records a *Key Down* event. It then counts the *clock* pulses until you release the key, when it records a *Key Up* event. The amount of time between the key down and the key up doesn't really affect the amount of memory required to record the note. Compare this to an audio tape recorder. With tape, *time* is the thing. A tape recorder will use the same amount of tape to record a minute of music, whether the signal contains one note or one hundred.

You might say that tape is *linear* — it is spent at a fixed rate — while digital sequencer memory is *dynamic* — it is used only as needed. Understanding the difference will help you to manage the TS-12 sequencer memory. For example, while key events (the notes you play) use up relatively little memory each, controllers such as pressure, mod wheel, pitch bend, etc., are recorded as a flood of numbers which can fill up the memory in a hurry. Thus if you're trying to squeeze one more track into a sequence when there is not much memory left, you know to go easy on the controllers.

What is a Sequence?

A Sequence on the TS-12 is a collection of 12 independent tracks and an effects algorithm and its settings. Each track has its own sound and complete set of track parameters (volume, pan, timbre and all the other track parameters, including MIDI channel, status, etc.) all of which are remembered with the sequence.

A sequence has a fixed length (though you can change it at any time) which is set by the length of the first track you record. A given sequence can be as short or as long as you like (within the limitations of memory).

Each sequence has an eleven-character name which you assign to it at the time of its creation. The name can be changed at any time from the Info sub-page of the Edit Sequence page.

When you select a new sequence, each track used within a sequence will send out a MIDI program change and MIDI volume instructions on its designated MIDI channel, unless the track has been assigned ----/RECV only status — in which case you can have the new track play a new internal sound.

What is a Song?

In Song Mode, sequences are assigned to play consecutively in any order, with up to 99 *Steps*, and up to 99 *Repetitions* of each Step. Within each Song Step, individual tracks within the sequence can be muted or transposed.

But a Song on the TS-12 is much more than just as collection of sequences playing in order. This is because each song has an additional set of 12 tracks which are completely independent of the tracks in its component sequences.

Each *Song Track* has its own sound program and a full set of track/performance parameters, just like a sequence track. The length of the song tracks is defined by the combined length of the steps and repetitions which make up the song. Song tracks are selected from the **Seq/Song Tracks 1-6** and **7-12** pages when a song is selected.

This means that after you've completed a number of sequences and linked them together to form a song, you have 12 more linear tracks which run the entire length of the song. This gives you 24 tracks to work with.

Sequencer “Transport Controls”

The three buttons at the bottom of the Sequencer section serve to start, stop and continue the sequencer, and to put it into Record and Overdub modes. In addition to these three buttons, either of the Foot Switches can be assigned to function just like the transport control buttons, when both hands are busy.



Assuming the Autopunch function is off:

- Pressing **Play** will start the current sequence or song (whichever is selected) playing from the beginning.
- Any Foot Switch assigned to PLAY/STOP will duplicate the behavior of alternate presses of the **Play** button and the **Stop/Continue** button.
- Pressing **Stop/Continue** will stop the sequencer (if pressed while it is running); or will play the current sequence or song from wherever it was last stopped (if pressed while the sequencer is stopped).
- Any Foot Switch assigned to STOP/CONT will duplicate the behavior of the **Stop/Continue** button.

- Pressing **Play** while holding down **Record** will start the sequencer recording on the current track from the beginning of the sequence or song.
- Pressing **Stop/Continue** while holding down **Record** will start the sequencer recording on the current track from wherever it was last stopped.
- Pressing **Record** while the sequencer is playing will put the sequencer into “Punch in” Standby mode. It will wait for you to either start playing or press **Record** again before going into Record on the current track.
- Pressing any Foot Switch assigned to either PLAY/STOP or STOP/CONT will initiate recording while the sequencer is in “Punch in” Standby mode.

When the Autopunch function is on, the sequencer will only enter and exit Record mode at the points specified by the Edit Times on the Locate page.

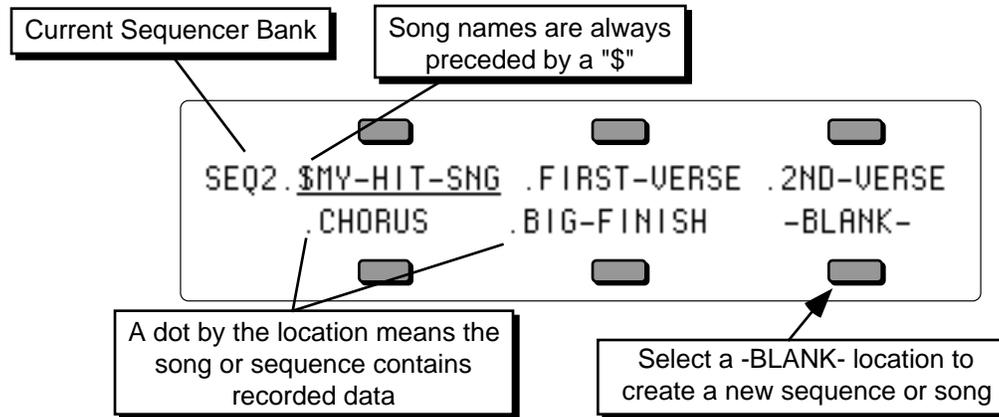
Sequencer Status

On most sequencer pages the lower-left-hand corner of the display indicates the *Sequencer Status*. The sequencer is always in one of the following states:

- STOP — Sequencer at rest
- PLAY — Playing current sequence (sequence selected)
- SNGS — Song Stop: sequencer at rest with a song selected
- SNGP — Song Play: playing current song
- REC — Recording on current track, first pass
- ODUB — Overdub: re-recording current track
- CNTF — Countoff playing prior to going into Play, Record, or Overdub
- REC (flashing) — Record Standby: waiting for you to play before going into Record (first track only)
- ODUB (flashing) — “Punch-in” Standby: waiting for you to play before going into Overdub
- MREC (flashing) — MIDI sync Record Standby: same as Record Standby except that the sequencer is synced to external MIDI clocks (CLOCK-MIDI on the Seq Control page) and is waiting for MIDI clocks as well as notes before going into Record. If the **Stop/Continue** button is pressed while MREC is flashing, the sequencer waits 5 seconds before exiting MIDI sync Record Standby.
- AUDP — Audition Play. This State is entered automatically from Record when the end of the sequence is reached (assuming LOOP=ON). After leaving Record and entering Audition Play, the sequence will continue to play in this state, with the newly recorded track, until you press the **Stop/Continue** button. Pressing **Stop/Continue** from this state will put you on the PLAY/KEEP Page (see below).
- AUDES — Audition Stop is entered when you stop the sequencer from the Audition Play state. To exit Audition Stop and return to the normal stop state, you must first instruct the TS-12 to KEEP either the new or the original track (see Audition Play/Keep Page later in this section).

Sequencer Banks

Pressing the **Seqs/Songs** button located beneath the display puts the TS-12 into sequencer mode. The ten **Bank** buttons (labeled 0-9) will now select Sequencer Banks. Each bank contains six sequencer locations, any of which can contain a sequence or a song, or may be blank.



Song names always have a dollar sign (\$) as the first character, so that you can tell at a glance which locations contain sequences and which are songs.

The names of sequences and songs which contain actual recorded track data are preceded by a dot (.) on sequencer bank pages. Locations which have not yet been defined as a song or sequence show "-BLANK-".

Selecting an undefined (-BLANK-) field will initiate the Create New Sequence or Song function (see Creating New Sequence or Song, later in this section).

Selecting a Sequence or Song

- Press **Seqs/Songs**, then press the **Bank** buttons labeled 0-9 to see the ten Sequence Bank pages.
- Pressing the soft button next to any of the six locations on a page selects that as the current song or sequence.

When you select a song or sequence it becomes underlined. The currently selected song or sequence is always underlined.

Playing Sequences and Songs

Try selecting a sequence, and pressing the **Play** button in the Sequencer section, to the right of the display. The selected sequence will begin to play.

While one sequence is playing you can select another one. An underline will begin to flash beneath the new sequence, but the original one will continue to play. When the first sequence is finished, the underline will switch to the new sequence, and it will play. In this fashion you can string sequences together in real time, as they play. The display always tells you which is playing (underline) and which is selected to play next (flashing underline).

Note: In this mode, all track parameters are not automatically updated when the next sequence begins playing. Only those tracks that contain data will be loaded in. The remaining tracks will retain the performance parameters of the previous sequence. Also, if the new sequence uses a different effect than the previous one, the audio output will be muted temporarily while the new algorithm is loaded.

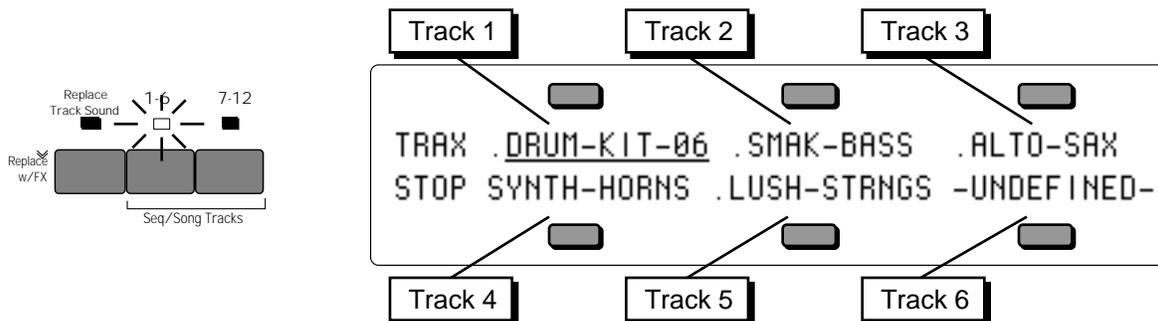
Press either the **Stop/Continue** button or any Foot Switch assigned to either **PLAY/STOP** or **STOP/CONT** to stop the sequence.

Sequencer Tracks

Each TS-12 sequence and song has twelve independent polyphonic *Tracks* on which you can record notes, controllers, and program changes using local TS-12 sounds, remote MIDI instruments, or both. These tracks are selected from the two Seq/Song Track pages, labeled **Seq/Song Tracks 1-6** and **7-12**.

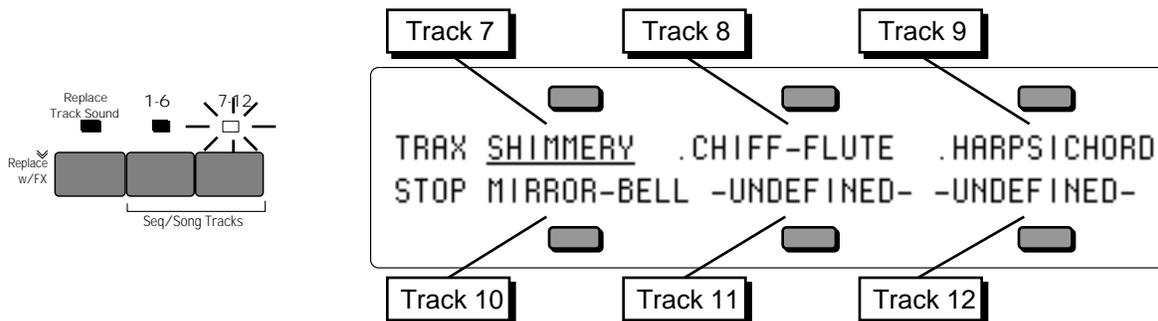
Let's take a look at the Seq/Song Tracks pages:

Press **Seq/Song Tracks 1-6**. This takes you to the first of the two pages:



The LED above the **Seq/Song Tracks 1-6** button lights, and the display shows the names of the programs on the six tracks of the current song or sequence. Press the soft button next to a track to select that track.

Press **Seq/Song Tracks 7-12**. This takes you to the second of the two Tracks pages:



The LED in the **Seq/Song Tracks 7-12** button lights, and the display shows the names of the programs on the remaining 6 sequence tracks. Tracks which show **-UNDEFINED-** instead of a program name have not yet been defined (to define an undefined track you just select it).

A dot to the left of the track location indicates that there is recorded data on the track.

On these two pages you can select and layer the tracks of a sequence (by clicking or double-clicking) just as you would on regular program bank pages. You can go back and forth between **Seq/Song Tracks 1-6** and **7-12** without losing what was selected or layered in the other half. The LEDs above the two Seq/Song Tracks buttons tell you where you are.

Replacing the Sound on a Sequence or Song Track

To replace the TS-12 sound on a given Sequence or Song track with a sound of your choice:

- While on either of the Seq/Song Tracks pages, select one of the six tracks.
- Press the **Replace Track Sound** button. The display will show program bank pages, but the **Sounds** LED will flash, indicating that you are in Replace Track Sound mode.
- Use the **BankSet** button to choose between User RAM, ROM, or Sampled Sounds, as you would when selecting sounds normally.
- Use the **Bank** buttons to locate the bank containing the sound you want.
- Underline the program you want to put on the track.
- Press **Seq/Song Tracks 1-6** or **7-12** to return to the Seq/Song Tracks page with the new sound on the track. Note that all of the track's Track Parameters (except for those marked with an asterisk "*" below) are left just as they were previously. The settings for the Track Parameters that are stored with each sound are installed onto the track with the sound; the other sequencer Track Parameters are never altered unless you edit them intentionally.

To copy a sound *along with its effect* into the sequence (replacing the current sequence effect with the one in the sound), you follow the same procedure as above, with the addition of double-clicking the **Replace Track Sound**.

- Press **Seq/Song Tracks 1-6** or **7-12** and select the track.
- Double-click (press two times quickly) **Replace Track Sound**.
- Use the **BankSet** button, the **Bank** buttons, and the soft buttons to pick a sound as before; but now each time you pick a new sound its effect will become the sequence effect.
- Press **Seq/Song Tracks 1-6** or **7-12** to return to the Seq/Song Tracks page with the new sound on the track, and its effect used by the sequence.

Tip: You can use the Replace Track Sound feature to audition different sounds while the sequence is playing. However, to permanently change the sound on a track, the sequencer must be stopped.

Using SoundFinder in Sequencer Mode

Here's how to select Programs that have the same defined Program Type in Sequencer mode. For this example, we'll replace the Program on a sequence track from a sequence used in the DEMO-SONG found on the TSD-200 floppy disk that came with the TS-12. Note that loading in any sequence file that has a flashing "P" will replace the RAM programs. If you have any customized Programs that you want to save, do so before proceeding:

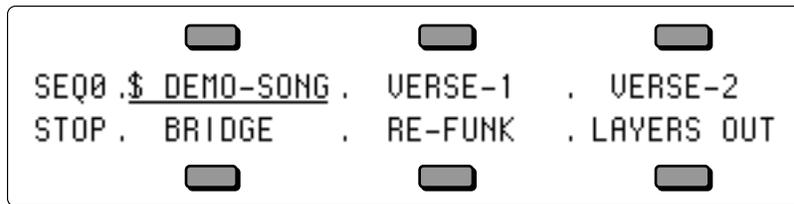
- Insert the TSD-200 disk into the disk drive.
- Press the **Storage** button.
- Press the bottom center soft button beneath DISK.
- Press the bottom center soft button beneath *LOAD*.
- Use the Data Entry Controls to select the file TYPE=30-SEQ/SONGS. The display shows:

```

LOAD FILE=TUTORIAL   P SIZE=256   *YES*
TYPE=30-SEQ/SONGS  BANKS 0-4   *NO *
  
```

- Press the soft button above *YES*.
- The display momentarily shows LOADING TUTORIAL, followed by DISK COMMAND COMPLETED, then it will return to the LOAD FILE page.
- Press the **Seqs/Songs** button.

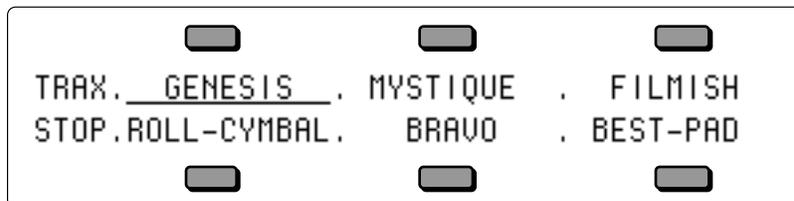
- Press the **Bank 0** button. The display shows:



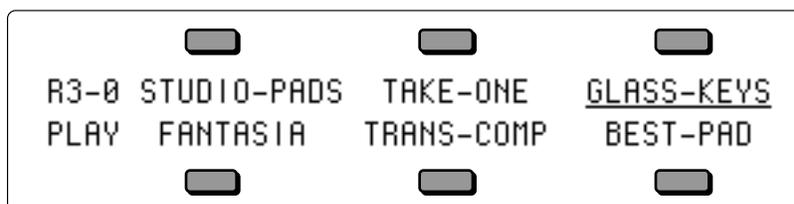
- Press the lower right soft button beneath LAYERS OUT. We will be replacing a track sound assignment in this sequence.
- Press the **Sequencer Control** button and set LOOP=ON. This way you can hear the LAYERS OUT sequence repeat continuously, allowing you to audition several different Programs without having to restart the sequence each time.

Note: The sequencer must be stopped in order to permanently change a track sound assignment. When the sequencer is playing, you can audition sounds, but when the sequencer stops, or when it loops, the original track sound is reinstalled.

- Press the **Play** button if you would like to hear this sequence. When you are finished listening to the sequence, press **Stop • Continue**.
- Press the **Seq/Song Tracks 1-6** button. The display shows:

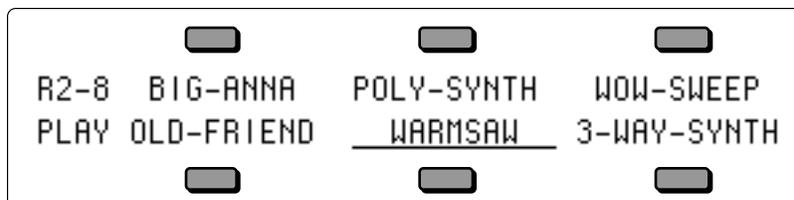


- Press the lower right soft button beneath BEST-PAD.
- Press the **Play** button.
- Press the **Replace Track Sound** button, followed by the **Down Arrow** button. The display shows:



The sequence will now be playing GLASS-KEYS where BEST-PAD used to be.

- Press the **Down Arrow** button three more times. The display shows:



This is the sound that we want to use to replace BEST-PAD.

- Press the **Stop • Continue** button, followed by the **Seq/Song Tracks 1-6** button. Notice that Seq/Song Track #6 still shows BEST-PAD. That's because you can't change a track sound

assignment when the sequencer is playing.

- Now that we've auditioned Programs within the same Program Type and found the Program that we want to use to replace BEST-PAD, press the **Replace Track Sound** button.
- The display shows the last viewed Sound Bank page. In this case it's R2-8. Press the soft button beneath WARMSAW.
- Press the **Replace Track Sound** button (its LED will turn off), and you will be returned to the Seq/Song Tracks 1-6 page. You have just successfully replaced a track sound assignment (BEST-PAD) with one of a similar Program Type (WARMSAW) within a sequence.

Tip: If you manually select a Program of a different type while the **Replace Track Sound** LED is lit, pressing the **Up/Down Arrow** buttons will now select Programs from the new type.

Layering Sounds on The Tracks Pages

In a preset, a maximum of two sounds may be layered with the selected sound. Within a sequence, you can layer as many as 11 sounds with the selected sound. You can have up to 12 tracks layered (stacked) on one key, or up to 12 different tracks split across the keyboard by using the Key Zone function described in *Section 4 — Understanding Presets*.

Layering sounds is the same as in a normal Preset Track Parameter page:

- Select a primary sound on either of the Seq/Song Tracks pages.
- Double-click the soft button for the track you wish to layer. Layered tracks are identified by a blinking underline. If a track is layered, it can be un-layered by pressing its soft button.

Sequencer Tracks and the Track Parameters

Every sequencer track has a full set of Track parameters which are saved with the sequence or song. The values of the following are remembered for each track:

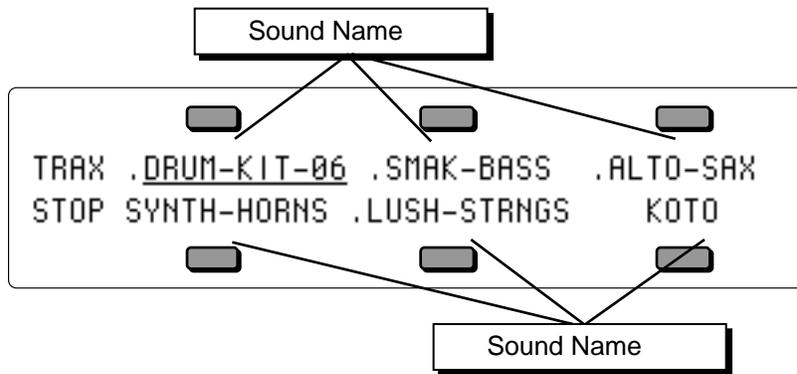
- | | |
|--|----------------------------|
| • Mix | • Sostenuto On/Off |
| • Pan & Pan Mode | • Pitch Bend On/Off |
| • Attack * | • Mod Wheel On/Off |
| • Release * | • Reset Controllers On/Off |
| • Brightness * | • All-Notes-Off On/Off |
| • Timbre * | • Patch Select Mode * |
| • External MIDI Controller (XCTRL) * | • Pressure Mode * |
| • Key Zone | • Volume Pedal Mode |
| • Velocity Range | • MIDI Status |
| • Velocity Sensitivity | • MIDI Channel |
| • Transpose | • MIDI Program * |
| • Detune | • MIDI Bank Select * |
| • Rate (LFO and/or Wave List Duration) * | • Effects Bus Routing |
| • Sustain On/Off | • Effect Mod Control |

Track Parameters marked with an asterisk "*" are stored with each sound.

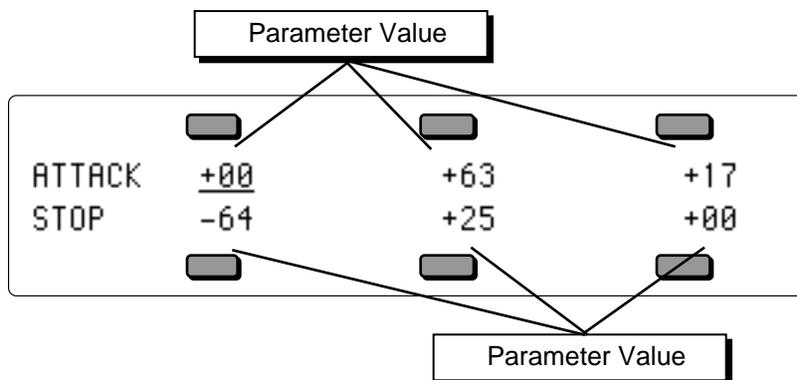
You should refer to *Section 4 — Understanding Presets* and *Section 5 — Preset/Track Parameters* for a full discussion of the performance/track parameters and their functions.

As described in *Section 1 — Controls and Basic Functions*, whenever you go from Sounds or Presets mode to the Track Parameter pages, the TS-12 displays the names of the three most recently selected sounds (on the top line) and their parameter values (on the bottom line).

Sequencer Tracks are similar, except that the names of the sounds and their corresponding Track parameters are shown on different pages. When you press **Seq/Song Tracks 1-6** or **7-12**, the TS-12 displays the names of the six sounds on those six tracks:

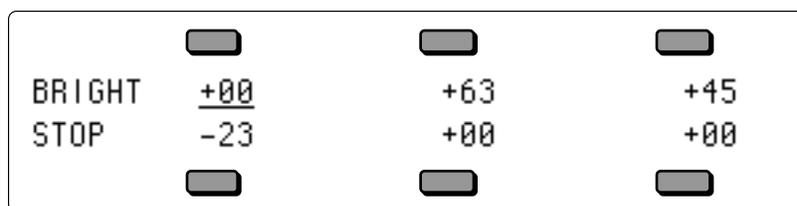


When you then select any of the Track parameter pages, the display will show only the parameter values for the six tracks, and not the names of the sounds:



Let's look at a Sequencer Track Performance parameter, and you'll get a better idea how this works. Using the Brightness/Timbre page as an example:

- Press **Seq/Song Tracks 1-6** or **7-12**. The display shows one the Tracks pages with the names of the programs on those six tracks.
- Press the **Brightness/Timbre** button. This takes you to the Brightness page:



Each of the six parameter values corresponds to one of the 12 track locations (the LED above the **Seq/Song Tracks 1-6** or **7-12** button will be lit to tell you which half you are in). You can verify this by pressing the **Seq/Song Tracks 1-6** or **7-12** button again. Repeatedly pressing either the **Seq/Song Tracks 1-6** or **7-12** button will toggle between the TRAX Page and the last-selected Track Performance parameter. This will help you keep track of what you're editing. Notice that the upper left corner of the display still shows the Track Parameter Page name, but it may appear differently for Sequence tracks, because there is more room to display full page name. Other than that, Track parameter editing for a sequencer track is the same as for presets. All Track parameter values are remembered for each track of each sequence and song.

Important:

In Sequencer mode, selecting and editing a track from a Track Parameter page does *not* change what is selected or layered on the Seq/Song Tracks 1-6 and 7-12 pages — i.e. it does not affect what you hear when you play the keyboard. This means that you can edit a track parameter value for one (or more) of the tracks within a group of layered sounds without changing the layer.

You can adjust volume, pan, timbre, etc. for tracks other than the selected track while playing back a sequence. However, this also means that you could edit a performance value for a track that you are not currently hearing from the keyboard, so be careful that you know what track(s) you are listening to in relation to what is selected on the Track Parameter pages.

The track that is selected on the Seq/Song Tracks 1-6 or 7-12 pages is the one that will be recorded if you go into record.

You should get in the habit of always selecting a track from the Seq/Song Tracks 1-6 or 7-12 page before going into record.

The Tempo Track and the Track Parameters

Note that the Tempo Track feature offers no Track Parameter values, and appears on all of the track parameter pages as TEMPO. For example, the Track Parameters Mix page would look something like this:

MIX	127	064	101
SNGS	069	(127)	TEMPO

Copying a Preset into 3 Sequencer Tracks

You can copy the three tracks of a preset, with all Track Parameter settings preserved, into three tracks of the current song or sequence. The preset will be copied whole into the three tracks on the upper or lower line of either the Seq/Song Tracks 1-6 or the 7-12 page:

- Press **Seq/Song Tracks 1-6** or **7-12** and select any of the tracks on the line (upper or lower) to which you want to copy the preset.
- Press **Preset** and use the **BankSet** and **Bank** buttons to select the preset you want to copy.
- While holding down the **Preset** button, press the same **Seq/Song Tracks 1-6** or **7-12** button as you did in the first step. The preset tracks are copied into the upper or lower line of that half of the TRAX page.

When you copy a preset into a sequence, the values of all the Track Parameters are copied. However, the selected and layered status of the tracks in the preset *is not* copied. Whichever tracks in the sequence are selected or layered when the preset is copied will remain so after it is copied. This also does not affect the track data in the sequence. The sequencer can only record one track at a time (except in Multi-Track Record, described later in this section). If you want the preset to play a sequence track, you must copy the sequence data to the other two tracks, if needed.

Copying a Preset Along With its Effect into 3 Sequencer Tracks

To copy a preset along with its effect into the sequence (replacing the current sequence effect with the one in the preset), follow the same procedure as above, with the addition of pressing the **Track Effects** button before pressing **Seq/Song Tracks 1-6** or **7-12** in the last step.

- While holding the **Preset** button down, first press the **Track Effects** button, then press **Seq/Song Tracks 1-6** or **7-12**. The Preset is copied to three tracks of the sequence and its effect becomes the sequence effect.

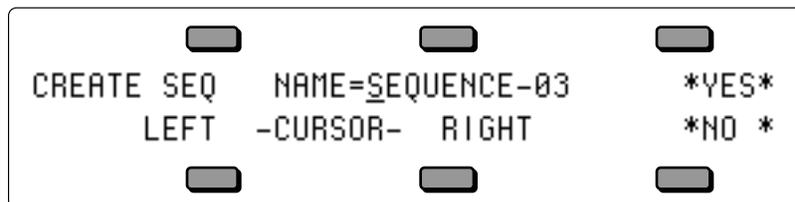
Creating a New Sequence

Creating a new sequence or song is easy:

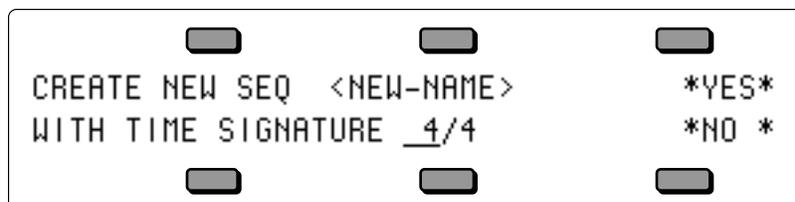
- On any of the Sequencer Bank pages, pressing the soft button nearest an undefined -BLANK- location will display the following prompt:



- Press the soft button above ***SEQUENCE***. The display shows:



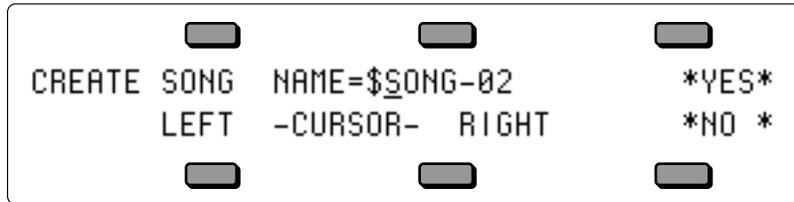
- Name the new sequence (or press ***YES*** to accept the default name). Under the first character is a cursor (underline). Use the data entry controls to edit the character, then use the soft (cursor) buttons beneath the words **LEFT** and **RIGHT** to move the underline to another character and edit that. Continue this until the display shows the name you want (or you can use the keyboard to enter the name data if the **KBD-NAMING** function is enabled on the System page).
- Press ***YES***. The display shows:



- Set the Time Signature. The time signature is set at the creation of a new sequence and cannot be changed later. Use the data entry controls to adjust the top half of the fraction, then press the soft button beneath the time signature to move the underline to bottom half, and adjust that. Continued presses of the soft button beneath the time signature will toggle between the upper and lower fraction values.
- Press ***YES***. The TS-12 returns to the current Sequencer Bank page with the new sequence selected.

Creating a New Song

- On any Sequencer Bank page, select a -BLANK- sequencer location, as described above. The display will show the CREATE NEW *SONG* OR *SEQUENCE* screen.
- Press the soft button above *SONG*. The display shows:



Song names are always preceded by "\$" to indicate their special nature. Note that you cannot change this \$ character. The other ten characters can be edited.

- Name the new song (or press *YES* to accept the default name, which is \$SONG-##). Use the data entry controls and the soft buttons labeled LEFT and RIGHT to edit the song name to create the name you desire.
- Press *YES*. The TS-12 returns to the current Sequencer Bank page with the new song selected.

Erasing All Sequencer Memory

When you want to erase all sequences and songs in the TS-12 sequencer memory, first *make sure you have saved any important data to disk*, then:

- Press and hold the **Presets** button.
- While holding down the **Presets** button, press the *middle* of the three soft buttons in the top row above the fluorescent display.
- The TS-12 asks: "ERASE ALL SEQUENCER MEMORY?"
- Press *YES*. The TS-12 erases all sequences and songs from memory. After the memory is erased, there will be one blank song and one blank sequence in locations 00 and 01 (there is always one song and one sequence in memory).

Recording a Sequence

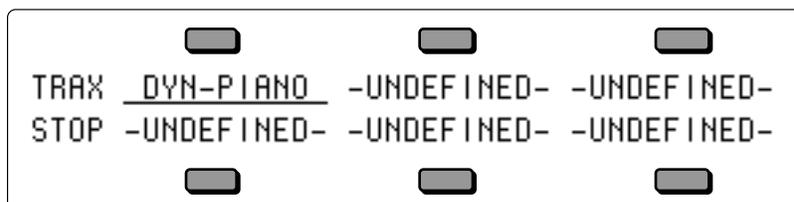
Here we will describe recording a new sequence from scratch. First we will concentrate on sequencing with the TS-12 alone, and then cover sequencing remote MIDI devices.

1) Create a New Sequence:

- Following the steps outlined earlier in this section, create a new sequence.

2) Select a Track:

- Press the **Seq/Song Tracks 1-6** button. The display shows the first six tracks of the new sequence. Seq/Song Track 1 is already defined and selected (there is always one track selected in a sequence) and the current program has been placed on the track. All other tracks are as yet -UNDEFINED-.



- If you want to begin recording the sequence with a track other than Track 1, press the soft

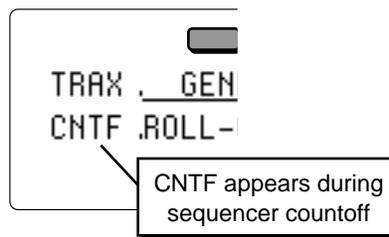
button next to that track. This defines the track and puts the currently selected sound on it. Otherwise, you can just leave Track 1 selected and start from there.

3) Select a Sound for the Track:

- Press **Replace Track Sound**. The display shows Program Bank pages; the **Sounds** LED is flashing.
- Select a sound as you normally would, using the **BankSet** button and the ten **Bank** buttons to locate the sound you want, and then selecting it by pressing its soft button.
- Press **Replace Track Sound** again to return to the Seq/Song Tracks page. The new sound is now assigned to the track.

4) Check the CLICK and COUNTOFF settings:

- Press **Click**. This page controls all the functions of the TS-12's built-in metronome. Underline the **CLICK** parameter and set to **CLICK=REC**. This will provide a click track when you are in record, but not during playback.
- Underline the **COUNTOFF** parameter and set to **COUNTOFF=REC**. This will play a one bar countoff before recording (but not when playing back) all tracks after the first. The TS-12 will display **CNTF** in the lower-left-hand corner of the display during countoff (when enabled on the Click page):



5) Record the First Track:

The length of the first track defines the length of the sequence. For this reason, there is a special procedure for recording the first track of a new sequence.

- While holding down **Record**, press **Play**. The click track starts playing, giving the tempo. The first beat of each measure is emphasized.
- Adjust the tempo. Press **Locate**. The Tempo parameter is always selected on this page. Use the **Data Entry Slider** and the **Up/Down Arrow** buttons to set it to the tempo you want. Or, with the sequencer running, you can tap on the soft button below the **TEMPO** parameter at the desired tempo.
- Play the keyboard to begin recording. The bar in which you start playing becomes Bar 1 of the sequence.
- Press **Stop/Continue** (or the assigned AUX Foot Switch) to end recording. The display will ask "KEEP FIRST TRACK?" The length (in bars) of the first track is shown in the lower left corner of the display. This will determine the length of the sequence.
- Press ***YES*** to keep the track, defining the length of the sequence, or
- Press ***NO*** to erase the first track and start over again.

6) Record Additional Tracks:

After you have answered ***YES*** to the question "KEEP FIRST TRACK?," all other recording, including re-recording the first track, will follow the same basic routine. The length of the sequence is now defined (by the length of the first track). The rest of the tracks will automatically have the same length.

- Press the **Seq/Song Tracks 1-6** button, and select a second track by pressing the soft button of any **-UNDEFINED-** track (or leave the first track selected if you want to record over it). The name of the sound and all the track parameters from the previous track are copied onto to the new track.
- Select a sound for the track. As shown in step 3 above, use the **Replace Track Sound** function

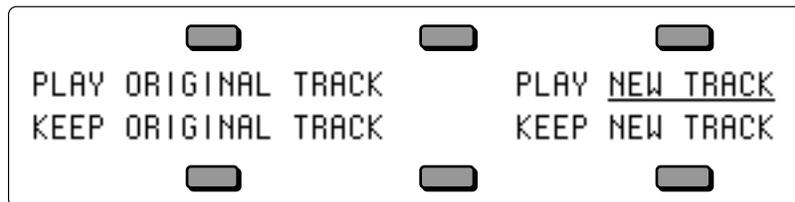
to put the sound of your choice on the selected track.

- Press **Record/Play** to begin recording. The click track will play for one measure (assuming COUNTOFF= REC or CLICK), then the sequencer will enter record mode. It will record whatever you play on the new track until:
 - 1) the end of the sequence is reached, or
 - 2) you press **Stop/Continue** (or press the assigned AUX Foot Switch).

At the end of the sequence, the TS-12 will leave record mode and (assuming LOOP=ON) enter Audition mode.

About the Audition Play/Keep Page

- Press **Stop/Continue** or the assigned AUX Foot Switch to stop the Sequencer. This puts you onto the Audition Play/Keep page:



- Press **PLAY ORIGINAL TRACK** to hear the track as it was before you recorded the new track. The first time you record a particular track, this isn't very useful, but it is invaluable when you begin to do second and third takes, since it allows you to compare the tracks before deciding which to keep.
- Press **PLAY NEW TRACK** to hear what you just recorded.
- Press **KEEP ORIGINAL TRACK** to leave the track as it was in memory, and delete the one you just recorded. If the track was empty before recording, pressing this button will leave it empty.
- Press **KEEP NEW TRACK** to save the new track into memory, replacing whatever was on the track before.

The Audition page appears after all track recording and after all track edit functions. The TS-12 always gives you a chance to audition changes to the track data before deciding whether to keep them.

Playing Tracks in Audition Mode

It is possible to alternate between playing Original and New tracks in Audition mode *without* having the track restart from the beginning, making comparisons more convenient. If the sequencer is playing, each time Play New or Play Original is selected, the context will instantly switch. Pressing **Play** will play the selected track from the beginning.

When ineligible buttons are pressed while in Audition mode, a message appears to indicate that it is necessary to decide which version of the most recently recorded track is to be kept *before* the desired action can be performed. The message appears momentarily, and then the display changes back to the Audition page.

“Punching In” on a Track

The TS-12 offers two methods for “punching in” (or re-recording) a specific part of a track. When AUTOPUNCH=OFF (on either the Locate or Sequencer Control sub-page), you can punch in manually just by playing the keyboard to start recording. When AUTOPUNCH=ON, the TS-12 will enter and exit Record mode automatically at the precise times that you specify on the Locate sub-page.

To Punch in manually on a track (meaning AUTOPUNCH=OFF on the Locate page):

- Press **Seq/Song Tracks 1-6** or **7-12** and select the track you want to record on.
- Press **Play** to start the sequence or song playing.
- Press **Record**. This puts the TS-12 in Overdub Standby — ODUB flashes in the lower left corner of the display and the sequencer is waiting for you to play keys before going into record.
- Start playing at the point where you want to punch in. As soon as you play anything the TS-12 goes into overdub (or record for a new track) and records what you play, leaving intact the part of the track before the punch in. Unless you then press **Stop/Continue** or the assigned AUX Foot Switch, new track data will be recorded from the point where you punched in to the end of the sequence or song.
- Press **Stop/Continue**. You will see the Audition page as shown earlier, letting you audition the new or the old track before deciding which to keep.

To Punch in and out automatically on a track (meaning AUTOPUNCH=ON):

- Set the Edit IN and OUT times on the Locate sub-page as described earlier in this section. These define the exact bar, beat and clock at which the TS-12 will enter and exit record.
- Press **Record/Play** to start the sequencer. It will begin to play but will not go into record until the Edit IN time is reached. You can play along with the sequence if you wish without being recorded.
- When the Edit IN time is reached the sequencer will automatically enter record, and will record whatever you play until the Edit OUT time is reached.
- At the Edit OUT time the sequencer automatically exits record and goes into Audition Play mode.
- Audition the new track as usual from the Audition page before deciding whether to keep the new or the old track.

When AUTOPUNCH=ON, the TS-12 will record events *only* within the window of time specified by the Edit times, no matter how you enter record. Thus if you press **Play**, then **Record** the TS-12 will wait for you to play before entering record, but recording will only be triggered by notes within the Edit times window. Notes played before the Edit IN time or after the Edit OUT time will not initiate recording.

If the RECORD MODE=LOOPED (on the Sequencer Control page) and AUTOPUNCH=ON, the sequencer will continue to go in and out of record at the Edit points each time the sequence repeats, for as long as you let it play.

Finding the BankSet, Bank, and Display Location for Sounds on Sequencer Tracks

To find the BankSet, Bank and Display location (U0-1.5, U1-3.1, R2-7.4, etc.) for the sounds assigned to sequencer tracks:

- Select the sequence or song using the **Seqs•Songs** button, the **Bank** buttons (0-9), and the appropriate soft button in the display.
- Press the **Seq/Song Tracks 1-6** (or **7-12**) button. The Seq/Song Tracks page shows:

The screenshot shows a 2x3 grid of tracks. The top row contains program names: TRAX, COUNTRY-KIT, FRETLESS, and CONCERTINA. The bottom row contains bank information: STOP, HARMON-MUTE, *BANK S8-0*, and -UNDEFINED-. Callout boxes explain that the top row shows program names for loaded/unmuted tracks, while the bottom row shows bank information for muted or not-loaded tracks. An empty track is shown as -UNDEFINED-.

Seq/Song Tracks with Programs show Program Name

Seq/Song Tracks with Sampled Sounds that are loaded and UNMUTED show the Sampled Sound name

Seq/Song Tracks with Sampled Sounds that are MUTED, or NOT LOADED show the BankSet and Bank location of the Sampled Sound

Empty Seq/Song Tracks will show -UNDEFINED-

- To identify the locations of the first six sequencer tracks, press and hold the **Seq/Song Tracks 1-6** (or **7-12**) button, and then press **Sounds**. The display will now show:

The screenshot shows a 2x3 grid of tracks. The top row shows program names and their bank set/bank: TRAX (R3-9 .1), COUNTRY-KIT (R3-4 .1), and FRETLESS (S8-8). The bottom row shows program names and their bank set/bank: STOP (R4-2 .2), HARMON-MUTE (U0-8 .2), and CONCERTINA (*****). Callout boxes explain that the top row shows bank set, bank, and display location for loaded/unmuted tracks, while the bottom row shows bank set, bank, and display location for muted or not-loaded tracks. An empty track is shown as *****.

Seq/Song Tracks with Programs now show the BankSet, Bank, and Display location of the Program

Seq/Song Tracks with Sampled Sounds that are loaded and UNMUTED now show the Sampled Sound BankSet and Bank location

Seq/Song Tracks with Sampled Sounds that are MUTED or NOT LOADED now show BankSet, Bank, and Display location of the Surrogate Program assigned to the Track

Empty Seq/Song Tracks will show *****

- Release both buttons and the Seq/Song Tracks page will be re-displayed.

See Section 14 — Understanding Sampled Sounds for more information about Surrogate Programs.

Edit Sequence Page — Sequence Edit Functions

Pressing the **Edit Sequence** button displays the sequence editing page. Pressing the button twice will display the sub-page containing the Add and Delete Bars functions.

The following functions can be selected from the Edit Song page:

- APPEND — Lets you append (attach) one sequence onto another.
- INFO — Provides information about the sequence; lets you adjust the tempo and, indirectly, the elapsed time.
- ERASE — Erase and undefine the sequence.
- COPY — Copy the sequence to another sequencer location.
- ADD & DELETE BARS — Increase or decrease the length of the sequence.

The MIDI Connection

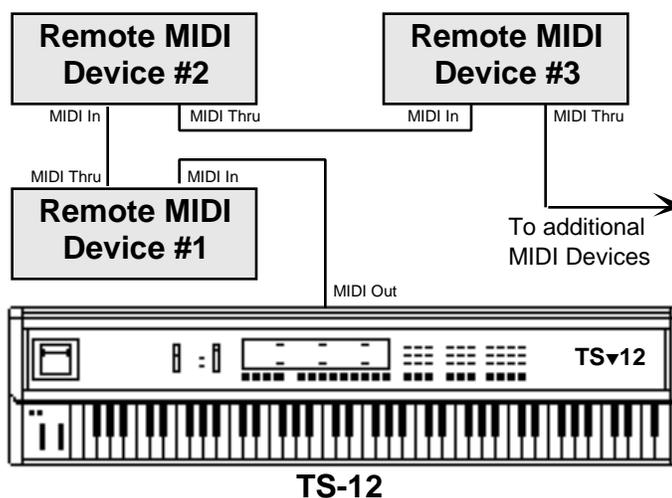
Almost everyone is familiar with MIDI — that magical connection that lets you play one instrument (or a whole roomful of them) from another. MIDI (Musical Instrument Digital Interface) is a standard that has been agreed upon by manufacturers for translating musical events into specific numbers which are transmitted and received by MIDI instruments.

When you play middle C on the TS-12, for instance, it instantly sends to its MIDI Out jack a series of numbers representing a *Key Down* event, along with the location of the note on the keyboard and how hard the key was struck. When you release the key the TS-12 sends a number meaning *Key Up*. A MIDI instrument connected to the TS-12 can receive and translate those numbers, and will play the middle C itself. The same thing happens whenever you move a controller, such as the Pitch or Mod Wheel, or when you select a new sound — each of these events is translated into a series of numbers which are transmitted by the MIDI Out jack.

MIDI Sequencing on the TS-12 — MIDI Connections

You can use the TS-12 sequencer to drive external MIDI devices, greatly enhancing the number of available voices and timbres. A sequence or song track can be assigned MIDI status (on the Track MIDI page) so that it plays only out MIDI; so that it will play only locally; or both, in which case it will play a local sound *and* send on its designated MIDI channel.

When controlling multiple remote MIDI devices, first connect the various devices to the TS-12, and to each other, as shown here. Connect the MIDI Out jack of the TS-12 to the MIDI In jack of the first device. Then connect the MIDI Thru jack of the first device to the MIDI In jack of the second device. Connect the MIDI Thru jack of the second device to the MIDI In jack of the third device. And so on, for as many devices as you will be using.



With this arrangement, once you set up the proper MIDI channels, etc., each remote MIDI device will receive and play only the data that is intended for it, and will “pass along” all other data. Also, each can be played from its own keyboard (as well as from the TS-12's) without affecting the others, because MIDI Thru jacks only pass along incoming MIDI data, and do not transmit what is played on the instrument.

This set up is ideal for controlling everything right from the TS-12. Simply by selecting the track which is set to the same MIDI channel as to a particular instrument, you can:

- 1) Play the remote MIDI device from the TS-12 keyboard
- 2) Record a track that will play back on the MIDI device when you play the sequence or song
- 3) Send the remote MIDI device Program Changes and adjust its volume (assuming the device receives MIDI Volume)

In other words, once you have made the appropriate connections, and set up the MIDI configuration of the tracks and all remote MIDI devices, you can use the TS-12's keyboard and its front panel to control and record all the remote MIDI devices in your rig.

MIDI Mode and Channel — Remote MIDI Device

The next step is to set up each remote MIDI device to receive only the MIDI information that is intended for it. When each of the receiving units is set to receive on a different MIDI channel (or a number of them, for multi-timbral units) you can control them all right from the TS-12.

For each remote MIDI device:

- **Set to POLY (OMNI OFF) or MULTI Mode.** Each remote MIDI device must be in a mode where it receives only on its selected MIDI channel (or channels). This is usually referred to as POLY (or OMNI OFF) Mode for receiving on a single channel, or MULTI mode for receiving independently on multiple channels. Consult the owner's manual if there is any question about a particular instrument.
- **Select a MIDI channel or channels.** The best idea is to assign each destination Instrument its own MIDI channel(s) and leave it that way. If you know, for instance, that a certain synth is always set to receive on MIDI channel 4, you can quickly set up a track to drive that synth by simply selecting an undefined track, then assigning that track MIDI Status and MIDI channel 4 on the Track MIDI page. Also when each destination instrument is always set to its own distinct MIDI channel, it means that different sequences and songs recorded at different times will always play the right instrument on the right track.

Once you have assigned MIDI channels to each instrument in your rig, *write them down*, and keep the paper handy for quick reference.

MIDI Track Configuration

After you have made the MIDI connections, and set up your remote MIDI devices as described above, you now configure the tracks of a sequence to send to those remote MIDI devices. Let's suppose that you are sequencing several remote MIDI devices, as depicted in the illustration on the previous page.

For each track which you want to drive a remote MIDI device:

- **Select a track.** Go to the Seq/Song Tracks 1-6 or 7-12 page and press the soft button corresponding to a track location to select a track.
- **Assign the track MIDI Status.** Press the **Track MIDI** button once to display the STATUS sub-page. The selected track is underlined. Use the data entry controls to set the track to LOCAL-OFF status. You will notice that when you play the keyboard now, it doesn't sound on the TS-12.
- **Assign the track a MIDI Channel.** Press the **Track MIDI** button again — the CHANNEL sub-page appears. Set the track to the MIDI channel of the remote MIDI device you want to sequence from that track. Playing the TS-12 keyboard should now play the Receiving Instrument.
- **Set the Program Number.** Press the **Track MIDI** button a third time — the PROGRAM sub-page appears. Now you can use the data entry controls to change the program that the

receiving unit is playing. While playing the TS-12 Keyboard, adjust the program number until the external instrument is playing the sound you want.

From now on, whenever you select that sequence, or when it plays as a step in a song, this track will send out this program change on its selected MIDI channel.

Note: When sequencing, you should always select the sounds for remote MIDI devices from the TS-12 as described above, and *not* from the remote MIDI device itself. This assures that the track has the proper program number for that instrument in each sequence.

Recording MIDI Tracks

Once everything is set up, you can proceed with recording MIDI tracks exactly as you would for tracks with local or both status. Tracks that are sent out MIDI are treated the same as internal tracks in terms of recording, overdubbing, punching in, editing, etc. Follow the same steps outlined earlier in this section for recording the first track and then for additional tracks. For each successive track you record, the procedure will follow the same lines:

- 1) Define the MIDI configuration of the track on the Track MIDI page
- 2) Record the track
- 3) Either keep or reject the new track from the Audition page

MIDI tracks can be selected and stacked from the Tracks pages, and can be muted or soloed from the Mix/Pan page, the same as any other tracks. Performance/Track parameters such as Mix, Key Zone and Transpose all apply to MIDI tracks just as with local tracks.

Most often you will be recording sequences and songs which contain some MIDI tracks and some local tracks. When this is the case, be sure that you assign local status (as opposed to both local and MIDI) to the tracks that you want to play only on the TS-12. This will avoid accidentally sending unintended MIDI data to an external instrument.

Additional Sequencer Functions

Recording Controllers into Sequencer Tracks

When recording sequencer tracks, the TS-12 will record all changes to controllers such as the pitch and mod wheels, pressure, foot pedal, patch selects, sustain, sostenuto, effect, foot switch, etc.

There are other, less obvious, controllers that will be recorded into the track if they are changed while the track is being recorded — The Pan, Attack, Release, Brightness, Timbre, XCTRL, and Rate Track parameters. When the sequencer is in Record or Overdub mode, if you go to any of these Track Parameter pages and change the value for the current track, the changes will be recorded. When you play back the track, you will notice that the screen is updated with the new value.

Tip: You can use the Controllers On/Off and the Velocity range parameters (found in the Track Parameters section on the front panel) as filters on sequence playback. For instance, you could audition the track with the Pitch Bend removed (if PBEND is set to OFF).

Changing a Sound within a Sequence or Song Track (Recording Program Changes)

The TS-12 can change track sounds in a sequence or song, allowing you to change the sound that is playing on the track as the track plays. There are two ways to do this. Both methods will have the same effect, but the first is best suited for local tracks, the second for MIDI tracks.

To change a sound within a local track:

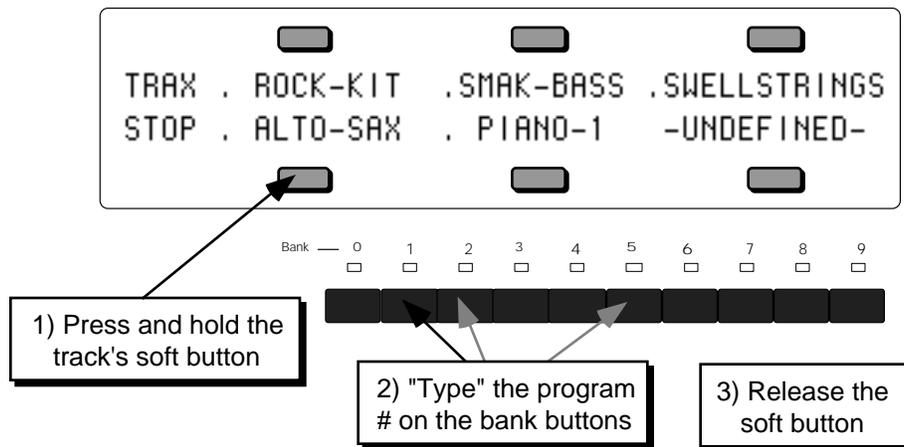
- On the Sequencer Control page, set the Record Mode to RECORD-MODE= ADD.
- Press **Seq/Song Tracks 1-6** or **7-12** and select the track that you want to change the sound.
- Press **Replace Track Sound**, press the **BankSet** and proper **Bank** button to locate the sound you want to change to. Don't select the sound yet, just leave its bank showing on the display.
- Hold down **Record** and press **Play** to start the sequencer recording.
- At the point where you want to insert the new sound, press the soft button next to the new sound. The track will begin to play the new sound and the change is inserted into the track.
- You can continue selecting new sounds in this mode as long as the sequence is in record. Each time the change will be recorded.

Tip: To change the sound and install its effect as the current sequence or song effect, double-click the **Replace Track Sound** button in step three above. Note that when Track STATUS=VOICE-OFF, LOCAL-OFF, or MIDI-LOOP program changes +60 will not change the effect. This is good for sending numbers above 60 to external devices.

To change a sound within a MIDI track:

- On the Sequencer Control page, set the Record Mode to RECORD-MODE= ADD.
- Press **Seq/Song Tracks 1-6** or **7-12** and select the track on which you want to change the sound.
- Hold down **Record** and press **Play** to start the sequencer recording.
- Press and hold down the soft button next to the track on which you want to record the program change.
- While holding down the soft button, type the number of the program change on the **Bank** buttons beneath the display. For example, to record program change #12, press 1, then 2; to record program change #106, press 1, then 0, then 6; and so on.
- At the instant you want the program change recorded, *release* the soft button. The program change is recorded (and sent to the remote MIDI device) when the soft button is released, so you can type the number in advance and let the button go at the exact instant you want the program change sent.

To send/record a MIDI program change:



- This same procedure can be used at any time to send a program change to a remote MIDI device, whether the sequencer is in record or not.

Note: If the track status is both, program changes recorded into the track will affect both the local *and* the MIDI program when the track is played back. This is true whichever of the above methods was used to insert the program change, even though the second method shown above does not change the local program at the time of recording.

Defining Track Pressure in Sequencer Mode

When Track PRESSURE=OFF:

- Local voices played from the keyboard or the sequencer will not respond to pressure.
- The sequencer will not record pressure into any tracks you record.
- The sequencer will not play back any Poly-Key or Channel pressure messages recorded on the track.
- The instrument will not transmit or receive pressure of either type via incoming MIDI.

Note: You should select Track PRESSURE=OFF whenever you don't want or need pressure for a given sound, particularly when sequencing. Pressure data eats up sequencer memory rapidly, so whenever you record a track with a sound that doesn't respond to pressure, set this parameter to OFF. This will avoid wasting valuable sequencer memory, and will avoid clogging up the MIDI data stream with a lot of unnecessary pressure information. Existing pressure information can also be removed from a track using the Filter command on the Edit Track page.

When PRESSURE=KEY:

- Local voices played from the TS-12 keyboard will not respond to pressure.
- The sequencer will record Poly-Key pressure received via incoming MIDI into any tracks you record.
- The sequencer will play back any Poly-Key pressure messages recorded on the track, and will ignore any Channel pressure on the track.
- The TS-12 keyboard will not transmit any pressure out via MIDI; however,
- Either Channel pressure or Poly-Key pressure will be received via incoming MIDI.

When PRESSURE MODE=CHAN:

- Local voices played from the TS-12 keyboard will respond to Channel pressure only.
- The sequencer will record Channel pressure into any tracks you record.
- The sequencer will play back any Channel pressure messages recorded on the track, and will ignore any Poly-Key pressure on the track.

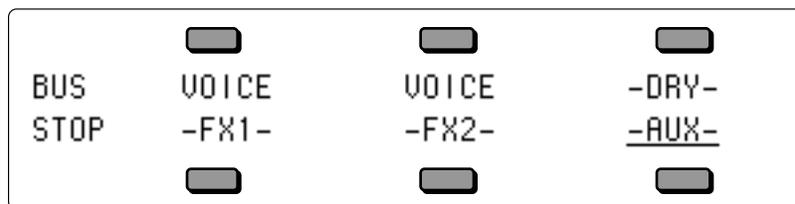
- The TS-12 keyboard will only transmit Channel pressure out via MIDI, however.
- Either Channel pressure or Poly-Key pressure will be received via incoming MIDI.

Note: When REC-SOURCE=MULTI on the Sequencer Control page, the TS-12 sequencer will always record both Channel and Poly-Key pressure (received via incoming MIDI), no matter what the Track PRESSURE parameter is set to.

Assigning a Track to the AUX Outputs

Until you change it, each sequencer track will be sent to the output bus which is programmed into the sound. In almost all cases this means that the track will be sent to the Main stereo outputs. To assign a track to the AUX outputs for separate processing:

- Press **Seq/Song Tracks 1-6** or **7-12** and select the track.
- Press the **Track Effects** button. The display shows the Effects Bus Override status for each track, with the current track underlined:



- Use the data entry controls to set the track to **-AUX-**. Anything played or recorded on that track will now be sent directly to the AUX outputs, bypassing the effects.

This page serves as a mixer for the various tracks, letting you determine how each track is routed to (or around) the effects. The available settings are:

- **VOICE** uses normal voice routing as programmed into the sound — this is the default setting in the track
- **-FX1-** forces FX2 voices to FX1; FX1 and DRY are unaffected
- **-FX2-** forces FX1 voices to FX2; FX2 and DRY are unaffected
- **-DRY-** forces all voices to the dry bus
- **-AUX-** forces all voices to the AUX outputs, bypassing the effects

Using the AUX Outputs as Separate Mono Outs

If you want to use the two AUX outputs as independent mono outputs, use the track Pan control in conjunction with the Effects Bus Override:

- Select a track, press the **Track Effects** button and assign the track to **-AUX-** as shown above.
- Press **Mix/Pan** twice to get to the PAN page. Set to **-63** to assign the track to the left AUX output only; or set to **+64** to assign the track to the right AUX output. You can also press the soft button for the track and define if the AUX jacks will receive a stereo or mono signal.

Edit Track Page — Track Edit Functions

Pressing the **Edit Track** button displays the top level track editing page. Pressing the button twice will display the track edit options sub-page. These edit functions will affect the currently selected track. If a sequence is selected, the current sequence track will be edited; if a song is selected, the current song track will be edited.

The following functions can be selected from the Edit Track page:

- **SHIFT** — Shift track forward or back in time by a number of clocks.
- **QUANTIZE** — Auto-correct notes to the nearest beat.
- **ERASE** — Erase all or part of the track.
- **COPY** — Copy all or part of the track to another track in any sequence.
- **TRANSCOPE** — Raise or lower the pitch of all or part of the track by octaves and semitones.
- **SCALE** — Scale (increase or decrease the level of) one or more controller(s) in the track.
- **EVENT-LIST** — Provides a comprehensive event editor allowing you to locate and edit any event in the track.
- **FILTER** — This powerful function lets you remove, or copy to another track, any range of notes, controllers, program changes, etc.
- **MERGE** — Merge, or combine, the data from one track with another.

Track Mix Functions — Mixing, Muting and Soloing Tracks

Once you have recorded a few tracks of a sequence, you will want to balance the levels of the tracks, and maybe listen to them one or two at a time. This is done from the Mix/Pan page.

Select a track from the Seq/Song Tracks 1-6 or 7-12 page, then press the **Mix/Pan** button. The display shows:

			
MIX	127	085	092
STOP	086	(127)	(127)
			

From this page, in addition to balancing the levels of the tracks in the sequence, you can solo and mute individual tracks just as you can with voices on the select voice page. Notice that the levels for any tracks *without recorded data* will appear in brackets:

- Press the soft button corresponding to a track to select the track for editing. The data entry controls will now adjust the level of the selected track from 00 to 127.
- Press the soft button of the selected track again to *Mute* the track. Muted tracks will have brackets around the volume number, as in tracks 5 and 6 above. Pressing a muted track's button will un-mute it, removing the brackets. If the track has no recorded data, you cannot unmute it.
- Rapidly double-click on a track's soft button to solo it. Asterisks will appear on either side of the soloed track, and all other tracks will get brackets to indicate that they are muted.
- Pressing the soft button of a soloed track will "un-solo" the track, returning all tracks to their previous status.
- When a track is soloed, you can select another track, then press its button again to "solo" it along with the other soloed track. In this way you can un-mute tracks one at a time to listen to any combination. Just press the soft button of any of the soloed tracks again to return all tracks to their previous status.

Song Mode

The TS-12's *Song Mode* is the key to unlocking its true power as a Performance/Composition Synthesizer. In song mode, you can chain a number of sequences together to form a song. Songs are made up of *Steps* — for each song step, you can choose a sequence to play and the number of repetitions of that sequence, as well as mute and transpose status for each track of the sequence.

But wait, there's more. Each TS-12 song also contains its own effects set-up (see below) and 12 additional tracks which are independent of the tracks in the component sequences that form the song steps. This gives you a 24 track sequencer with tremendous flexibility. You can choose which musical parts you want to put into the component sequences, and which parts you put in the song tracks. Discussion of song tracks begins on the next page.

Switching Effects in Song Mode

As you are probably aware, when you are playing TS-12 sounds and you select a sound which uses a different effect from the previous one, there is a momentary muting of the audio output. This is because, like all digital signal processors, the TS-12 requires some time to switch from one effect to another. The software program which defines the effect must be changed for each different effect.

The same holds true when selecting sequences. Each sequence has its own effects set-up, which is completely programmable and is saved with the sequence. When you select a sequence, if the new one has a different effect than the previous one there will be a brief muting of the output.

This can pose a problem when playing a song — as a new song step begins to play, if the sequence in that step has a different effect than the previous one, there might be a muting of the audio output. Since it is usually not desirable during sequencer play to mute the output, the TS-12 offers some alternatives.

The SONG STEP EFFECT parameter on the Sequencer Control page determines which effect(s) will be heard when a song is played:

- When SONG STEP EFFECT=SEQ, each time a new sequence begins as a step in a song, its effect will be loaded, resulting in a brief muting of the output (unless the new effect is the same as in the previous sequence).
- When SONG STEP EFFECT=SONG, the effect which is stored in the song will be used for all the song steps and there will never be any muting or “glitching” of the output when new sequences play.

The setting of this parameter is saved with each song. Whenever a new song is created, it defaults to SONG STEP EFFECT=SONG. This ensures that there will be no output muting, but it also means that a sequence might sound different in a song than when it is played on its own.

If you use the SONG STEP EFFECT=SEQ setting for a given song, you can minimize the muting by doing the following:

- Whenever possible, use the same effects algorithm in sequences which will be adjacent to each other in the song.
- Program a rest into the beginning of sequences where the effect will switch to a different algorithm from the previous one. Or create a silent one-bar sequence whose only function is to switch to a new effect. Then make sure the sequences that follow use the same effect.

Edit Song Page — Song Edit Functions

Pressing the **Edit Song** button displays the top level song editing page. Pressing the button twice will display the Song Step Editor. If you press the **Edit Song** button when a sequence is selected, the display will respond SONG NOT SELECTED and will not allow you onto this page.

The following functions can be selected from the Edit Song page:

- **ADD-TEMPO-TRK** — Allows you to add a tempo track to an existing song
- **INFO** — Provides information about the song and lets you adjust the tempo
- **ERASE** — Erase and undefine the song
- **COPY** — Copy the song to another sequencer location
- **EDIT STEPS** — Edit the song steps, chaining sequences together to form the basic song structure

Editing Song Steps — Using the Song Step Editor

For each Song Step you want to create, on the Edit Song Page:

- Select the Sequence Name field, which for Step 1 of a new song will read SEQ= *SONG-END*.
- Press the **Up** or **Down Arrow** button to define the song step and select among the sequences in memory until the display is showing the name of the sequence you want to play during that step.

Tip: When the cursor is beneath either STEP or SEQ, pressing and holding one of the **Bank 0-9** buttons, followed by a soft button in the display will automatically select that sequence for the defined song step.

- Select the number of Repeats (REPS=##), and adjust the number of times you want the sequence to play during the step. If you only want the sequence to play once during the song step, leave it set to 01.
- Press **TRACKS** on the Edit Song page to reveal the Mute/Transpose sub-page shown above. If you want to mute any tracks for that step, select the character(s) representing the track(s) on the upper line of the display and set to **M**. To transpose tracks during the step, select the character(s) representing the track(s) on the lower line of the display and set to **T**. Select and adjust the Transpose amount.
- Press STEP=## once to select it, and again to return to the Song Step Editor page.
- Once the Sequence and number of Reps is correct, select STEP=## and press the **Up Arrow** button to select the next step (STEP=*SONG-END*) and edit that in the same way. For each successive Song Step, select the Sequence Name and use the **Up/Down Arrow** buttons to choose a sequence; then set the number of repeats, then proceed to the next step.
- There is always one final step which reads SEQ=*SONG-END*) after the last defined step in the Song.

To go to a different Step in the Song:

- Underline Step Number, and use the **Up/Down Arrow** buttons to go to any step within the song. After you have finished editing the Song Steps (or at any point during the process, for that matter) you can go back through the song to check that all the steps are right.

To change anything in an existing Song Step:

- To change any of the variables (sequence name, number of reps, track mute or transpose status) within a Song Step which has already been created, simply go to that step, as described above, select the thing you want to edit and change it.

To Insert a step anywhere in the song:

- Press STEP=## and go to the step *before* where you want to insert the step. That is, if you want to insert a step between Step 2 and Step 3, go to Step 3.
- Press INSERT. A BLANK step (the display reads SEQ = -BLANK-) is created.
- Select the Sequence Name field and use the **Up/Down Arrow** buttons to select a sequence for the new Step.
- Set the number of repeats and any mute or transpose settings for the step as shown earlier.

To Delete a step anywhere in the song:

- Press STEP=## and go to the step that you want to delete.
- Press DELETE. The step is erased and all steps after it are moved down by one.

When you are done editing the song, press **Locate** (or any other sequencer page button) to exit. You can then press **Play** to hear your new song.

Song Tracks

A Song on the TS-12 is much more than simply a group of sequences chained together. Once you have created a song and edited its steps, you can record another complete set of 12 song-length tracks. These *Song Tracks* are completely independent from the individual sequence tracks; each has its own sound and complete set of track parameters. The length of the song tracks is determined by the combined length of the song's component sequences.

Let's suppose you have constructed a song. For our example, we will take three sequences, each using up to 12 tracks, and combined those sequences into a song:

- Step 1 of the Song is Sequence 01 (a 4-bar Sequence) for 1 Repeat;
- Step 2 is Sequence 02 (an 8-bar Sequence) for 1 Repeat; and
- Step 3 is Sequence 03 (a 4-bar Sequence) for 1 Repeat.

Your Song would look like this:

SONG		
Song Step 1: Sequence 01 (4 bars)	Song Step 2: Sequence 02 (8 bars)	Song Step 3: Sequence 03 (4 bars)
Sequence Track 1	Sequence Track 1	Sequence Track 1
Sequence Track 2	Sequence Track 2	Sequence Track 2
Sequence Track 3	Sequence Track 3	Sequence Track 3
Sequence Track 4	Sequence Track 4	Sequence Track 4
Sequence Track 5	Sequence Track 5	Sequence Track 5
Sequence Track 6	Sequence Track 6	Sequence Track 6
Sequence Track 7	Sequence Track 7	Sequence Track 7
Sequence Track 8	Sequence Track 8	Sequence Track 8
Sequence Track 9	Sequence Track 9	Sequence Track 9
Sequence Track 10	Sequence Track 10	Sequence Track 10
Sequence Track 11	Sequence Track 11	Sequence Track 11
Sequence Track 12	Sequence Track 12	Sequence Track 12

Now, with the song selected, you can press the **Seq/Song Tracks 1-6** and **7-12** buttons and see an entirely new set of empty tracks. These are the song tracks. Continuing with the above example, the song tracks might look like this:

SONG		
Song Step 1: Sequence 01 (4 bars)	Song Step 2: Sequence 02 (8 bars)	Song Step 3: Sequence 03 (4 bars)
Sequence Track 1	Sequence Track 1	Sequence Track 1
Sequence Track 2	Sequence Track 2	Sequence Track 2
Sequence Track 3	Sequence Track 3	Sequence Track 3
Sequence Track 4	Sequence Track 4	Sequence Track 4
Sequence Track 5	Sequence Track 5	Sequence Track 5
Sequence Track 6	Sequence Track 6	Sequence Track 6
Sequence Track 7	Sequence Track 7	Sequence Track 7
Sequence Track 8	Sequence Track 8	Sequence Track 8
Sequence Track 9	Sequence Track 9	Sequence Track 9
Sequence Track 10	Sequence Track 10	Sequence Track 10
Sequence Track 11	Sequence Track 11	Sequence Track 11
Sequence Track 12	Sequence Track 12	Sequence Track 12
Song Track 1 (16 bars)		
Song Track 2 (16 bars)		
Song Track 3 (16 bars)		
Song Track 4 (16 bars)		
Song Track 5 (16 bars)		
Song Track 6 (16 bars)		
Song Track 7 (16 bars)		
Song Track 8 (16 bars)		
Song Track 9 (16 bars)		
Song Track 10 (16 bars)		
Song Track 11 (16 bars)		
Tempo Track or Song Track 12 (16 bars)		

Song tracks are treated like normal sequence tracks whose length is equivalent to the combined length of all the sequences which make up the song. The length of the song tracks is set according to the song length at the time the first song track is recorded. Changes made to the song structure after the first song track is recorded will not affect the length of the song tracks.

- You can change the program on a song track using the Replace Track Sound function, just as you would a sequence track.
- You can enter record (by holding down **Record** and pressing **Play**) and record on any of the twelve song tracks. Follow the same procedures (as outlined earlier in this section) for recording song tracks like you would for sequence tracks. The only difference is that a song track is associated with the song itself and not with the individual sequences that comprise the song.
- You can edit the song tracks using any of the Track Parameter functions. Selecting any Track Parameter when a song is selected will cause the current song track to be edited.
- You can use the Sequence Edit functions to edit the song tracks as a group, erasing them, adding and deleting bars, or copying the song tracks to another sequence. When a song is selected, the Sequence Edit functions will affect the song tracks, as if they were a sequence.
- You can solo, mute, and adjust the mix of song tracks from the Mix/Pan page as with sequence tracks.
- You can “mix down” the volume and pan of song tracks over the length of the song (see the description on the following page).

Viewing Sequence Tracks in Song Mode

When a song is selected, what you see on the Seq/Song Tracks pages and the track parameter pages depends on the setting of the EDIT TRACKS parameter on the Sequencer Control page.

- When EDIT TRACKS=SONG, the Seq/Song Tracks pages and the Track Parameter pages will show the song tracks. Any changes you make will affect the song tracks only.
- When EDIT TRACKS=SEQ, the Seq/Song Tracks pages and the Track Parameter pages will show the tracks for the individual sequences which make up the song steps. Any changes made to these tracks when a song is selected will *not* be remembered after the song step is done playing. To change anything about a sequence track you must first select the sequence and then change it there.

When a song is selected and EDIT-TRACKS=SEQ, the LED's above the **Seq/Song Tracks 1-6** and **7-12** buttons will *flash* to remind you that the track data is for the currently selected sequence in the song step and *not* the actual song tracks.

Tip: There is a shortcut for toggling between EDIT TRACKS= SEQ and SONG — While on either of the Seq/Song Tracks pages, *rapidly* double-click the **Seq/Song Tracks 1-6** or **7-12** button. This switches between the song tracks and the sequence tracks, just as if you had changed the setting of the EDIT TRACKS parameter. The LED above the tracks button *flashes* when you are looking at sequence tracks; it remains *solidly lit* when you are looking at song tracks.

Mixing Down Sequence and Song Tracks in Song Mode

After you have created and edited a song, you can “mix down” the volume and pan of the sequence tracks that make up the song steps, and of the song tracks themselves. The mixdown process does not affect the data in the individual sequences that compose the song steps; it creates a song-length *Mixdown Track* (which is actually a part of the song track) on which you can record mix and pan changes which will affect the sequence and/or song tracks over the course of the entire song. You can use this function to fine-tune the dynamics of certain tracks during part of a song, or to simply fade them out at the end of the song.

To Record Mix or Pan Changes to Sequence Tracks in a Song:

- Select a song containing sequence tracks you want to mix down.
- Press **Seq/Song Tracks 1-6** or **7-12** and select the song track corresponding to the sequence track you want to mix down. For example, if you want to record volume or pan changes to Track 3 of each sequence throughout the song, you must make sure that *song* track 3 is selected on the Seq/Song Tracks 1-6 page.
- Press **Sequencer Control**, and set the Record Mode parameter to RECORD MODE= MIXDOWN.
- Press **Sequencer Control** again, set the Edit Tracks parameter to EDIT TRACKS=SEQ (or, you can double-click the **Seq/Song Tracks 1-6** button; see above).
- Press **Seq/Song Tracks 1-6** or **7-12** and select the sequence track you want to mix down.
- Press **Mix/Pan**. The display shows the mix levels for the tracks, with the current track underlined (or press **Mix/Pan** again to record dynamic panning changes).
- While holding down **Record**, press **Play**. The TS-12 enters Overdub.
- Use the **Data Entry Slider** or the **Up/Down Arrow** buttons mix the volume (or pan) of the selected track. All changes you make will be recorded.
- At the end of the song, or when you press **Stop/Continue**, the Audition Play/Keep page appears. Here you can audition the changes before deciding whether to keep the new or the original track.
- To mix another track, press **Sequencer Control** twice and set the Edit Tracks parameter to EDIT TRACKS=SONG; press **Seq/Song Tracks 1-6** or **7-12** and select a different track; then set the Edit Tracks parameter back to EDIT TRACKS=SEQ. Now press **Mix/Pan** and repeat the procedure.

To Record Mix or Pan Changes to a Song Track:

- Select a song containing song tracks you want to mix down.
- Press **Sequencer Control**, set the Record Mode parameter to RECORD MODE= MIXDOWN.
- Press **Sequencer Control** again and set the Edit Tracks parameter to EDIT TRACKS=SONG. (Note that you can toggle between Song tracks and Sequence tracks in song mode by double-clicking the **Seq/Song Tracks 1-6** or **7-12** button.)
- Press **Seq/Song Tracks 1-6** or **7-12** and select the song track you want to mix down.
- Press **Mix/Pan**. The display shows the volume levels for the tracks, with the current track underlined (or press **Mix/Pan** again to record dynamic panning changes).
- While holding down **Record**, press **Play**. The TS-12 enters Overdub.
- Use the **Data Entry Slider** or the **Up/Down Arrow** buttons mix the volume (or pan) of the selected track. All changes you make will be recorded.
- At the end of the song, or when you press **Stop/Continue**, the Audition Play/Keep page appears. Here you can audition your changes before deciding which to keep.

Important:

The mixdown data is *always* recorded into the song track which is selected on the Seq/Song Tracks page, whether you are mixing a sequence track or a song track. You *must*, therefore, select the appropriate-numbered song track (while EDIT TRACKS=SONG on the Sequencer Control page) before entering Record, even if you then switch to EDIT TRACKS=SEQ to mix a Sequence track. For example, if you want to mix down Sequence track 3 over the length of the song, you must have song track 3 selected.

Tip: In Song Mode, if you want to fade a sequence track in from a 000 value, you must first select the individual sequence and set the appropriate track to 000, otherwise when starting overdub, the sequence track will default to its original setting.

A Few Notes About Mixdown Mode

Mixdown volume and pan are recorded on the song track in a special form of ADD mode. When you record mixdown volume or pan, the information is *added* to the data in the song tracks. This means that:

- If you have recorded Mixdown volume or pan into a track and want to erase and re-record it, you must first remove the original volume or pan using the Filter command on the Edit Track page. Otherwise new mixdown information would be added to (and thus conflict with) the existing information.
- If you erase the song track, the mixdown volume and pan data will be lost. Recording notes, controllers, etc. on the song track does not affect the mixdown information, but erasing the track (using the Erase command on the Edit Track) page will remove the mixdown data.

Whenever possible, you should use this function as the last step in the production chain, after you have finished changing the song length, recording and erasing song tracks, etc.

Note: The dynamic mixdown discussed here, which allows recording mix and pan changes over time, applies only to sequence and song tracks while in song mode. In sequence mode, the settings on the Mix and Pan pages are saved for each track of the sequence, but the setting will not change over the course of the sequence.

Tip: You *can* use the optional CVP-1 foot pedal to record volume changes into a sequence track while the sequence is selected. Just set to PEDAL=VOL on the System page, and then record the foot pedal changes in ADD mode. This will record Volume (MIDI controller #7) messages into the track which are separate from the mixdown volume described above.

Sequencer Tempo Track

As of software version 2.0, songs are created with Song Track 12 assigned to be a Tempo Track by default. This allows you to record continuous tempo changes to the sequences that make up a song. Here's how:

- First create a song by selecting a -BLANK- Seqs/Songs location. Name the song if you wish.
- Press the **Edit Song** button, and press the soft button beneath EDIT STEPS.
- Press the lower middle soft button to select the SEQ parameter, and use the Data Entry Controls to select a sequence for this song step. The song must be made of at least one sequence (with recorded data) in order for the Tempo Track feature to work.
- Press the **Seq/Song Tracks 7-12** button. Notice that Song Track 12 shows *TEMPO-TRK* in the display.
- Press the soft button underneath *TEMPO-TRK* to select it. If you play the keyboard, you will hear nothing. That's because a Tempo Track functions differently than tracks that contain sounds, and can only record and play tempo events.
- Press the **Sequencer Control** button. The display shows something like this:

```
CONTROL  CLOCK=INT  RECORD-MODE=REPLACE
SNGS     TEMPO=+00  ACTUAL=025      LOOP=ON
```

When the Tempo Track is selected on the Seq/Song Track 7-12 page, the AUTOPUNCH switch (normally found in the bottom center of the Sequencer Control page) is replaced with the ACTUAL tempo value. The Song TEMPO parameter allows you to increase or decrease the tempo(s) of the sequences that make up the song: When TEMPO=+00, the ACTUAL value shows the actual tempo of the sequence corresponding to the song step that is currently playing. Raising or lowering the TEMPO value will re-compute the actual sequence tempo, and the actual value will show the sequence tempo biased by the TEMPO value. The TEMPO value range for songs is -64 to +63.

- We recommend setting the RECORD-MODE parameter to either REPLACE or ADD when recording a Tempo Track (LOOPED and MIXDOWN are not recommended)
- Press the soft button beneath the TEMPO value.
- While holding down the **Record** button, press **Play**.
- At this point, you can use the Data Entry Controls to adjust the tempo. The sequencer will record the tempo changes as you make them. At the end of the song, or when you press **Stop/Continue**, the Audition Play/Keep page appears. Here you can audition the tempo changes before deciding whether to keep the new or original track.

Note: Do not load any Seq/Songs that have been saved with Tempo Track events into a TS-10 or TS-12 using software earlier than version 2.0. The Tempo Track feature is incompatible with older software.

Removing the Song Tempo Track

When the Tempo Track feature is used, you are limited to 23 Seq/Song Tracks. If you do not need to record continuous tempo changes, you can gain back the Song Track 12 for recording a sound, but you will lose any continuous tempo changes that you may have recorded.

To Remove the Song Tempo Track:

- With a song selected, press the **Seq/Song Tracks 7-12** button. Its LED should be solidly lit (showing the song tracks). If the Seq/Song Tracks LED is flashing (showing sequence tracks), double-click the button. The display should show *TEMPO-TRK* in the Song Track 12

location (bottom right in the display).

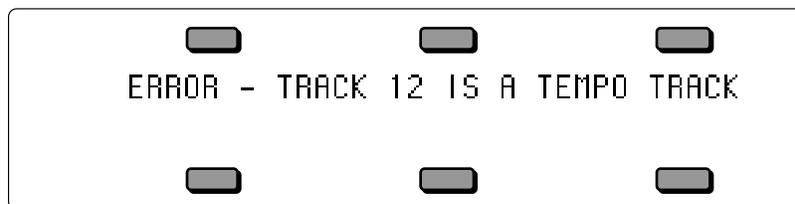
- Press the soft button beneath *TEMPO-TRK* to select it.
- Press the **Edit Track** button, and select the ERASE command by pressing its soft button.
- The display asks ERASE TRACK 12? Press the soft button above *YES*. The display will return to the Seq/Song Tracks 7-12 page, and the Tempo Track will now be -UNDEFINED-.
- You can now select Song Track 12 to assign it the last selected sound. You can then use the **Replace Track Sound** button, just as you would for any other track, to change the sound on Song Track 12.

If you change your mind, you can use the ADD-TEMPO-TRK command on the Edit Song page to regain the Song Tempo Track feature. See *Section 11 — Sequencer Parameters* for more about the ADD-TEMPO-TRK feature.

Tempo Track Edit Functions

The following Edit Track commands will function normally when a Tempo Track is selected:

- SHIFT — causes the tempo changes to move ahead or back in time by a specified number of clocks.
- ERASE — is used to erase a Tempo Track, and convert it into a normal song track.
- COPY — can be used to copy a Tempo Track from one song to another song. However, you can only copy a Tempo Track to another Tempo Track. If you try to copy a Tempo Track to a different sequence or song track, the following error message will be displayed:



- EVENT-LIST — allows you to individually edit each Tempo Track event. For this function, Tempo Track events appear as TMP (see below).
- FILTER — can be used to selectively remove Tempo Track events.
- MERGE — functions in a similar way to the COPY command; you can only merge a Tempo Track to another Tempo Track.

Note: The Edit Track QUANTIZE, TRANSPOSE, and SCALE commands will *not* function when a Tempo Track is selected. The above error message will be displayed when a Tempo Track is selected and these commands are invoked.

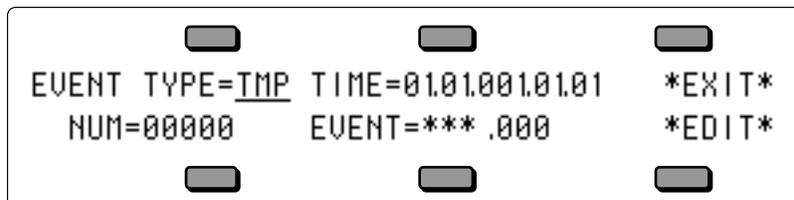
Thinning Out Tempo Changes Using the Event Editor

When you record Tempo changes with the Tempo Track feature, the Data Entry Controls will “scroll” through every value between where you start and where you want to end. For instance, if your song Tempo Track value starts at +00, at the bridge in your song (song step 3), and you want to slowly increase the tempo to +05, and then at the beginning of the second verse (song step 4) instantly return to +00, the Tempo Track events will scroll through all values between +05 and +00. These extra Tempo Track events can be eliminated using the Edit Track EVENT-LIST command. Here's how:

- 1) First create a song with at least four song steps, as explained later in this section.
- 2) Select Song Track 12 (*TEMPO-TRK*) of the song (it should be underlined).
- 3) Press the **Locate** button, followed by the lower left soft button in the display to select the TEMPO parameter. This page shows the step of the song you are currently in and the name of the sequence assigned to the step, and allows you to record tempo changes to the Tempo Track. The TEMPO parameter defaults to +00. If it is not set at this value, set it to +00 at this

time using the Data Entry Controls.

- 4) Press **Record** then **Play**.
- 5) At the bridge (song step 3), press the **Up Arrow** button five times slowly to increase the tempo.
- 6) At the end of song step 3, quickly press the **Down Arrow** button five times to return the tempo to +00. You can either let the song finish playing, or press the **Stop • Continue** button.
- 7) On the Audition page, press the soft button beneath KEEP NEW TRACK. You have just recorded a Tempo Track to your song. Now we'll go into the Event Editor to eliminate unwanted Tempo Track events.
- 8) Press **Edit Track** twice, and then press the lower left soft button to select EVENT-LIST.
- 9) Press the upper left soft button to select the Event Type parameter, and use the data entry controls to set it to TYPE= TMP (tempo). The display looks something like this:



- 10) Press the soft button beneath the NUM parameter.
- 11) Press the **Up Arrow** button once. The display now shows the first Tempo event value (+01), as it slowly increases within the third song step.
- 12) Press the **Up Arrow** button four more times. The display should show the fifth Tempo event value (NUM=00005). This is located within the third song step (the bridge in your song), and is the fastest tempo that we want. The next four Tempo events (+04, +03, +02 and +01) are the ones that we want to delete — so that at the beginning of the fourth song step (the second verse), the song tempo will instantly change from +05 to +00 without any gradual tempo changes.
- 13) Press the **Up Arrow** button one more time. This shows the sixth Tempo event (NUM=00006) with a value of +04 (EVENT=TMP.+04.XXX) that we want to delete.
- 14) Press the soft button beneath *EDIT*.
- 15) Press the top center soft button above DELETE. This returns you to the previous display.
- 16) Press the **Down Arrow** button once, then the **Up Arrow** button once. This now shows that the sixth Tempo event value (EVENT=TMP.+04) was deleted, and the seventh Tempo event value (EVENT=TMP.+03.XXX) is now in its place.
- 17) Repeat steps 14 through 16 three times. Each time you repeat these three steps, you are eliminating another recorded Tempo event value from the Tempo Track. When you are finished, the display should show the sixth recorded Tempo event (NUM=00006) with a value of EVENT=TMP.+00.XXX.
- 18) Now let's place this Tempo event at the exact beginning of the fourth song step (if it isn't already there).
- 19) Press the soft button beneath *EDIT*.
- 20) Press the bottom center button. The display shows START TIME=XX.XX.XXX.XX.XX.
- 21) Use the Data Entry Controls and set the START TIME to TIME=04.XX.XXX.XX.XX. This sets the Start Time to begin at Song Step 4.
- 22) Press the bottom center button again. The second value shows the repetition (REP) number. Use the Data Entry Controls to set this to 04.01.XXX.XX.XX.
- 23) Press the bottom center button again. The third value shows the bar number. Use the Data Entry Controls to set this to 04.01.001.XX.XX.
- 24) Press the bottom center button again. The fourth value shows the beat number. Use the Data Entry Controls to set this to 04.01.001.01.XX.
- 25) Press the bottom center button again. The fifth value shows the clock number. Use the Data Entry Controls to set this to 04.01.001.01.01.
- 26) Press the soft button above *EXIT*. This returns you to the EVENT TYPE page.

- 27) Press the soft button above *EXIT*.
- 28) You can audition your tempo changes by pressing the soft button above PLAY NEW TRACK, and keep them by selecting KEEP NEW.

You have just successfully eliminated four Tempo Track events (+04, +03, +02, and +01) using the Event Editor.

Using Multi-Track Record

Tracks do not have to be selected in order to have data recorded on them, but they must be defined. Each channel of incoming MIDI data will be recorded on the *lowest-numbered* TS-12 track which has the corresponding MIDI channel number. For example, if both track 1 and track 2 are set to MIDI channel 1, only track 1 will receive and record any data because it is the lowest-numbered track set to MIDI channel 1. It is suggested that you set each track to a different MIDI channel to avoid confusion.

A newly created sequence (or song) will have MIDI channels 1 to 12 automatically assigned to the 12 tracks in ascending order, but all of the tracks except track 1 are initially UNDEFINED. Selecting undefined tracks while on the Track Select page (TRAX) will cause all the settings from the previously selected track to be copied to the new track, including the MIDI channel number. You will have to make sure that the channel assignments and other settings are correct *after* you have defined the appropriate number of tracks to record on.

Suggestion for Advanced Users:

If you wish to define a new track but leave its settings alone, you can use Replace Track Sound after underlining one of the new track's Track Parameters (i.e. MIDI Channel). Underlining this parameter sets up the new track to have its sound replaced without actually "selecting" the track. This method allows you to define the track without changing most of the settings (except for MIDI Program number, Timbre, Release, and Pressure mode). *Beware - this technique can cause problems if a MIDI loop is present.*

Note: MIDI Program Changes will define the tracks on which they are received. If your external sequencer sends program changes on each track before any other event data, then the tracks will be automatically defined, and the MIDI channel settings will not be altered. You can see if this happens by creating a new sequence on the TS-12, playing your external sequence, and checking which tracks became defined.

Tip: If you will be doing a lot of Multi-Track recording, you may find it useful to create a template sequence which has no track data recorded on it to use as a starting point for each recording. Give it an easily recognizable name like "MULTI-TRACK", and simply copy this template sequence to an unused location before starting each new recording. You can then edit the copy to suit the particular needs of the current multi-track recording.

There is no Audition when using Multi-Track Record. All new tracks that received data are kept automatically after recording ends. The "EDITING DATA..." message is displayed while the sequencer is processing the data you have recorded. The time required for processing depends on how much data and how many tracks were recorded, and it can take several minutes. After the processing is complete, the Locate page is displayed. You can either re-record or erase the tracks (or the entire sequence or song) if you do not wish to keep the results after recording. Multi-Track Record always operates in Replace mode, regardless of the setting of the REC-MODE switch on the Sequencer Control page.

Data is not recorded on tracks whose status is set to MIDI-OFF, but *all defined tracks* will have "dots" next to the program name after recording, even if they do not have any actual track events on them.

If external sync is being used (CLOCK=MIDI), recording begins with the first clock received after the MIDI Start command. If internal sync is selected (CLOCK=INT), then recording begins when the first note is received.

Note: With the SQX-70 installed, the sequencer can record over 97,000 notes. However the sequencer record buffer is of a limited size, and can only record 16,000 notes at one time. As a result, you may see an OUT OF MEMORY message if you exceed the size of the record buffer. (this is most common in multi-track record). If this occurs, try editing the incoming data into several smaller sequences; then, once recorded into the TS-12 sequencer, append them together.

Basic Multi-track Recording from an External Sequencer

The following procedure is the basic method for recording a multi-track sequence from an external sequencer into the TS-12.

- Set MODE=MULTI on MIDI Control page.
- Set CLOCK=MIDI and REC-SOURCE=MULTI on the Sequencer Control page(s).
- Disable count-off on *both* systems to avoid problems.
- Disable sequence looping on the external sequencer.
- Create a new sequence with the correct time signature.
- Make sure that the external sequencer will send its track data on MIDI channels that the TS-12 is set up to receive (track MIDI channels 1..12 by default).
- Make sure that the external sequencer will send program changes at the start of each track to automatically define the necessary tracks on the TS-12, or define them yourself on the TS-12 manually.
- Press **Record** to enter MIDI Record mode (MREC will be flashing indicating that the TS-12 is waiting for MIDI Start and Clock messages).
- Start your external sequencer playing its sequence. When the external sequence stops, or when you press **Stop** on the TS-12, the TS-12 will show "EDITING DATA..." for a time and then display the Locate page.
- Set CLOCK=INT on the Sequencer Control page and press **Play** to hear what you have recorded. You may then decide that the results are satisfactory, or if not, you can try again or erase the sequence.

Recording into the Sequencer in a MIDI Loop

Use the following basic procedure if you want to record into the TS-12's sequencer from its own keyboard in a MIDI loop. You can record to a single track, or to multiple stacked tracks, depending on which tracks are selected, and how you set the REC-SOURCE parameter on the Sequencer Control page:

- Set MIDI-TRK-NAMES=ON on the System page.
- Set MODE=MULTI, LOOP=ON, START/STOP=OFF and PROG-CHG=OFF all on the MIDI Control pages.
- Set REC-SOURCE=MIDI (to record onto a single track with Audition) or REC-SOURCE=MULTI (to record onto multiple stacked tracks with no Audition) on the Sequencer Control page.
- Enter Seqs/Songs mode and create a new Sequence. Select and define all 12 tracks.
- Set the Track STAT (Status) to MIDI-LOOP for all 12 tracks.
- Set each of the tracks to a discrete MIDI channel (we recommend assigning tracks 1-12 to MIDI channels 1-12 to avoid confusion).
- Connect the MIDI Out jack of the TS-10 to the MIDI In jack of the TS-10 with a single MIDI cable.
- Select or stack the track(s) that you want to record on. Playing the keyboard will transmit out the MIDI Out jack, back in the MIDI In jack, and will play the sounds that are assigned to the selected and stacked tracks.
- Enter record as usual. If REC-SOURCE=MIDI, data will only be recorded on the primary (solidly selected) track, and any stacked tracks will be de-selected after Audition. If REC-SOURCE=MULTI, data will be recorded on all selected and stacked tracks, but there will be no Audition.

Using the Step Entry Recorder

All notes played and all control changes made in Step Entry mode will *always* be recorded into the new track.

With GATE-TIME=HELD, if you enter a note and release the key without advancing the track location (time), then the note will be recorded with minimum (1/64th note) duration. This is also true when using AutoStep because the key down and key up appear to occur at the same time.

For controllers, it is necessary to advance the track location after entering the event so that they will be correctly recorded. Use *STEP* or advance one of the TIME fields.

It is possible to record trills played with monophonic sounds when AUTOSTEP=ON if you set the gate-time to be less than the step size, and remember to change GATE-TIME to HELD just before you finally release the held key. For example, if STEP=1/16, then GATE-TIME must be less than 1/16 (i.e. 1/16T, 1/32, etc.).

Tip: If you press and hold the **Record** button while in Step Entry Record mode, you will be able to play keys without having them recorded. Keys are not recorded while **Record** is held down. This is useful when you are looking for the right key(s) to play next and you do not want to inadvertently enter wrong notes into the track.

Access to Other Pages while in Step Entry

Your access to other pages is restricted in Step Entry mode, in a way similar to Audition mode. You may get to any of the Track Parameter pages, the Click page, and the System page. The Seq/Song Tracks 1-6 or 7-12 pages may be displayed, and you may use Replace Track Sound to enter program changes onto the current track, but you may not change tracks. The **BankSet** and **Bank** buttons may be used in Replace Track Sound mode to change BankSets and Banks. Pressing any of the other restricted buttons will return you to the Step Entry page. This is a convenient way to get back after you have selected one of the accessible pages while in Step Entry mode.

Entering Audition Mode from Step Entry

As with the normal mode of recording, when you have completed recording a track in Step Entry mode, either by pressing **Stop/Continue** or by reaching the end of the track, you will enter Audition mode, which behaves as it always has.

Entering Step Entry Record after Locating or from Play

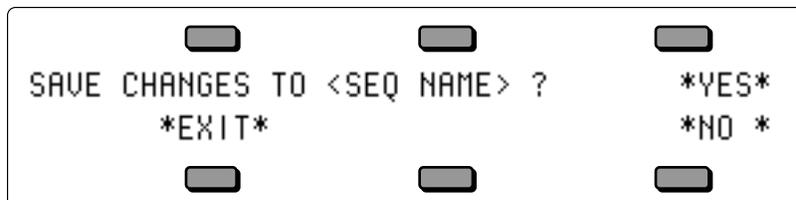
You can use the Locate page to get to the place in the track where you wish to begin Step Entry recording, and then hold **Record** and press **Stop/Continue** to enter record at that point. You may also be in PLAY and press the **Record** button at the point where you want to start Step Entry recording. Note that autopunch does *not* affect Step Entry recording.

About the SAVE CHANGES... Page

Along with the notes, controllers, and program changes that are recorded on each track, there are many other parameters that are saved with each sequence or song. These are:

- the name and the tempo of the sequence or song
- the sound assigned to each track on the Seq/Song Tracks 1-6 and 7-12 pages, including Sampled Sounds and Surrogate Programs
- all Track Parameters for each track of the sequence or song
- which tracks are selected and layered on the Seq/Song Tracks 1-6 and 7-12 pages
- The Track Command edit times
- the setting of the LOOP switch on the Sequencer Control page
- the Sequence or Song effect algorithm and its settings
- the setting of the CLICK parameter on the Click page
- for Songs, the settings of the EDIT TRACKS and SONG STEP EFFECT parameters

Whenever you record any track of a sequence or song, all of these values are automatically saved — that is, they will be remembered by the TS-12 if you leave the sequence (by selecting another one) and return to it later. However, if the SAVE CHANGES parameter is set to ASK, and you edit any of the above values, and then select a new sequence or song before you record any new track data, the following message will appear:



- Pressing ***YES*** saves the sequence or song, with the current settings of all the parameters listed above, into sequencer memory.
- Pressing ***NO*** leaves the settings of the parameters listed above as they were when you last recorded a track, or last answered ***YES*** when exiting the same sequence.
- Pressing ***EXIT*** aborts the decision, keeping you in the same sequence or song, with all of the settings for the above parameter unchanged, but still not permanent. This is useful if you're not sure, and want to check before deciding.

No matter which response you select, the recorded track data (notes, controllers and program changes) are always saved. Sometimes it's hard to remember, when you get this page, exactly what you changed. As a general rule, if you are happy with the sequence or song as it is, answer ***YES***. If you have just been experimenting with different tempos, Programs, MIDI configurations, etc., and want to leave the sequence as it was before your experiments, answer ***NO***. If you're not sure whether you want to save or discard your changes, and you want to re-examine the sequence or song, press ***EXIT***.

Tip: There is a quick way to save any changes you make to a sequence or song. After you have changed any of the values listed above and want to save them, press the **Seqs/Songs** button to return to the sequence bank page, and select the same sequence or song again. The display will ask "SAVE CHANGES TO <SEQ NAME>?" Answer ***YES*** and the changes you made to the sequence or song will be saved.

As mentioned earlier, you can avoid being asked to save changes by setting the SAVE CHANGES parameter on the Sequencer Control page to NO. For live performance, and other applications in which you want to experiment with tempo, track parameters, etc. without being bothered about saving the changes, this is the preferred setting. And if you are always willing to commit to your edits as you go, SAVE CHANGES=AUTO is the preferred setting.

Section 11 — Sequencer Parameters

The following parameters control the TS-12 sequencer. Parameters for creating and manipulating sequences, songs, and the tracks contained within each are covered here. For a basic overview of the concepts involved, refer to the previous section.

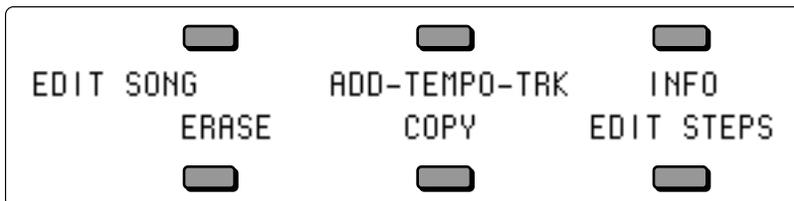
Sequencer Editing Functions



The three Edit buttons in the top row of the Sequencer section of the front panel provide access to the various sequencer editing functions. These are divided into Song, Sequence, and Track editing functions. Pressing any of these three buttons shows a menu of the available functions in that category.

Edit Song Page Parameters

Press the **Seqs/Songs** button (underneath the display) and select a Song. Then press the **Edit Song** button. If you press the **Edit Song** button when a sequence is selected, the display will respond SONG NOT SELECTED and will not allow you onto this page. The display shows:



ADD-TEMPO-TRK

The ADD-TEMPO-TRK command allows you to add a Tempo Track to an existing song that does not have a Tempo Track. This command is only visible when the currently selected song does not contain a Tempo Track:

- If Song Track 12 is -UNDEFINED-, pressing the soft button above ADD-TEMPO-TRK will immediately make Song Track 12 become a Tempo Track.
- If Song Track 12 contains a sound and/or sequencer data, the following prompt will be displayed:

```
ERASE SONG TRACK 12 AND          *YES*
REPLACE WITH TEMPO TRACK        *NO *
```

- Pressing *YES* will erase Song Track 12, replacing it with a Tempo Track. The display will momentarily show TEMPO TRACK INSTALLED, and the ADD-TEMPO-TRK Song Command will no longer be visible.
- Pressing *NO* will abort the procedure and leave Song Track 12 intact.

INFO Sub-Page

Pressing the soft button above INFO displays a page containing information about the song, including the song name, the size in blocks, the song tempo offset, number of steps, and the elapsed time at the current tempo. From this page, you can also rename the song, and adjust the tempo offset. The parameters on this page are:

**NAME**

Used to rename the song. Pressing the soft button above the Song Name displays a sub-page which allows you to edit the name of the song. Use the data entry controls and the LEFT and RIGHT cursor buttons to rename the song. Then press *SAVE* to return to the INFO page with the new name.

SIZE

Range: (read only)

This read only parameter displays the size of the current song in blocks. Blocks are the units of 512 bytes used by the sequencer and disk memory management software. One block generally represents 128 events, though this is only an approximation and depends on the specific data recorded.

TEMPO

Range: -64 to +63, or EXT

This lets you speed up or slow down the entire song without changing the tempo of the component sequences. Changing the song tempo offset automatically adjusts the tempo of each of the sequences in the song, within the legal limits of 25-250 BPM.

STEPS

Range: (read only)

This read only parameter indicates the number of steps in the song.

TIME

This shows you the total time of the song in minutes, seconds, and hundredths of a second. It is readout only — you cannot directly change it. However, when you change the Song Tempo Offset (TEMPO above) you will see the time readout change accordingly.

ERASE

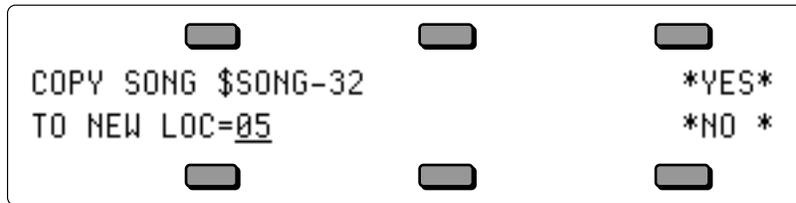
The Erase command will erase the currently selected song and leave its location undefined. First, make sure the Song you want to erase is selected. Then:

- Press **Edit Song**.
- Press the soft button beneath ERASE. The display asks ERASE CURRENT SONG <SONG NAME> FROM LOCATION ##?
- Press *YES* to erase and undefine the song, or press *NO* to cancel.

COPY

Use this command to copy the currently selected song into another sequencer location. Note that the original song remains intact in its original location. First, make sure the Song you want to copy is selected. Then:

- Press **Edit Song**.
- Press the soft button beneath COPY. The display shows:



- Use the data entry controls to select a location for the copied song. Note that only undefined sequencer locations will be available for selecting.
- Press *YES* to copy the song to the new location (or press *NO* to cancel). The new song will be given the same name as the original one you copied. You can rename it from the Edit Song INFO page as described above.

EDIT STEPS Page

Pressing EDIT STEPS displays the song step editor page. Here you chain sequences together to define the basic structure of the song.

A song is composed of *Steps*. Each Step consists of:

- A sequence which will play during that step,
- The number of Repetitions, or *Reps*, of the sequence during the step, and
- The Mute and Transpose status for each sequence track during the step.

When you select EDIT STEPS, the display shows the Song Step Editor page:



INSERT

Inserts a blank song step *before* the current song step.

DELETE

Removes the current song step, and shifts the remaining steps down to fill the gap.

STEP

The step number can be edited using the data entry controls, allowing you to move up and down through the song and view each step. A song can contain up to 99 steps.

SEQ

Range: various

Selects the sequence to be used for the current song step. An empty song step will show SEQ= - BLANK-. To put a sequence into an empty song step (thus defining the step) simply underline this field and then press the **Up Arrow** button. The final step (the one after the last defined song step) will always read SEQ=*SONG-END*. To add another sequence at the end of the song, select SEQ=*SONG-END* and press the **Up Arrow** to define the step. This puts a sequence in that step and moves the Song End back one more step.

REPS

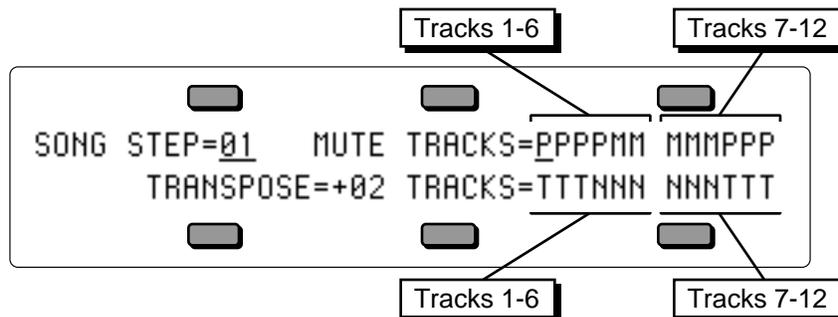
Range: 01 to 99, or FS

This controls the number of times the sequence in the current song step will be repeated.

FS stands for Foot Switch. In order to use this function you must first assign one of the Foot Switches (on the System page) to SONG-STEP. When REPS=FS, the song step will loop continuously until the assigned foot switch is pressed. When the foot switch is pressed, the current step will finish playing and then advance to the next step.

TRACKS

Selecting this option from the song step editor page displays a sub-page which allows you to Mute or Transpose specified tracks for the current song step.



STEP

Shows the current step number. Pressing this button again when it is already selected will return you to the Song Step Editor page.

MUTE TRACKS

Range: P (Play) or M (Mute)

The number 2 and 3 soft buttons each select a group of 6 positions which control the muting of sequence tracks for the current song step. Repeated presses of the soft button will scroll across the set of 6 tracks, and allow each track to be muted or unmuted individually. An M indicates that the track is muted for the entire step, and a P indicates that the track will play.

TRANSPOSE

Range: -12 to +12 semitones

Sets the transpose amount to be used by any tracks which are set to Transpose for that song step (see below). This will raise or lower the pitch of the entire track.

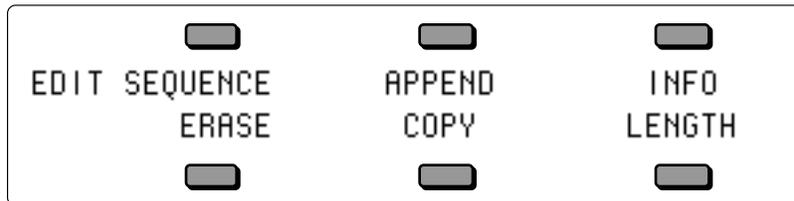
TRANSPOSE TRACKS

Range: N (Normal) or T (Transposed)

The number 5 and 6 soft buttons each select a group of 6 positions which control the transposition of tracks for the current song step. Repeated presses of the soft button will scroll across the set of 6 tracks, and allow each track to be transposed or left normal (no transposition) individually. A T indicates that the track will be transposed, and an N indicates that the track will play at normal pitch.

Edit Sequence Page Parameters

- Press the **Edit Sequence** button. The display shows:

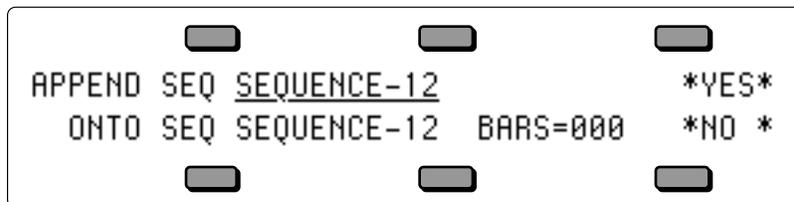


These commands affect the currently selected sequence. If a song is selected, these commands affect the song tracks in the song.

APPEND

This function allows you to append one sequence onto the end of another (or to itself, doubling its length). A sequence which you specify will be appended (or “tacked on”) to the end of the currently selected sequence.

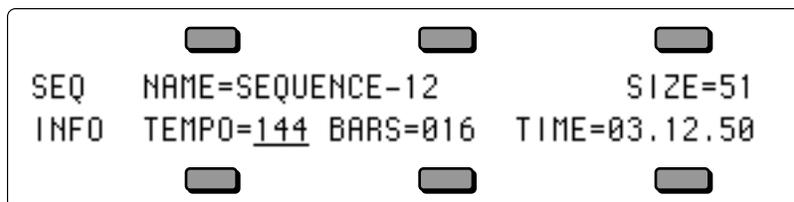
- Make sure the sequence onto which you want to append another is selected.
- Press **Edit Sequence**.
- Press APPEND. The display shows:



- Use the data entry controls to select the sequence which will be appended to the current sequence. The default source is the current sequence, which allows the current sequence to be easily appended to itself.
- The bottom of the display shows the destination sequence, and the total number of bars in the current sequence.
- Press ***YES*** to append the sequence specified in the top line of the display onto the end of the current sequence (or press ***NO*** to cancel).

INFO

Selecting INFO displays a page of information about the currently selected sequence, including the name, the size in blocks, the tempo, the number of bars and the elapsed time at the current tempo. The tempo is the only field which can be directly edited, but the elapsed time field will be updated to reflect the new tempo.



NAME

Pressing the soft button above the sequence NAME displays a sub-page which allows you to edit the name of the sequence. Use the data entry controls and the LEFT and RIGHT cursor buttons to rename the sequence. Then press ***SAVE*** to return to the INFO page.

SIZE Range: (read only)
Displays the size of the current sequence in events.

TEMPO Range: 025 to 250, or EXT
This displays the tempo of the current sequence. Changing the tempo here has the same effect as changing it on the three other pages where tempo appears; Click, Sequence Control, and Locate. On this page, however you can see the elapsed time change as you change the tempo (see below). When CLOCK=MIDI, this parameter reads TEMPO=EXT, and cannot be edited.

BARS Range: (read only)
Indicates the number of bars in the sequence.

TIME Range: (read only)
This shows you the total time of the sequence in minutes, seconds, and hundredths of a second. It is read only — you cannot directly change it. However, when you change the tempo (above) you will see the time readout change accordingly.

ERASE

The Erase command will delete the currently selected sequence from memory and leave its location undefined (-BLANK-). This command can also be used to erase all song tracks (when a song is selected). First, make sure the sequence you want to erase is selected. Then:

- Press **Edit Sequence**.
- Press ERASE. The display asks ERASE CURRENT SEQ <SEQ-NAME> FROM LOCATION ##?
- Press *YES* to erase and undefine the sequence, or press *NO* to cancel.

COPY

Use this command to make a copy of the currently selected sequence in another sequencer location. If this command is used on a song, it will copy the song track data only into a new sequence. This command only copies the saved Track Parameter settings; it will not copy any temporary Track Parameter edits you may have made. Note that the original sequence or song remains intact in its original location. First, make sure the sequence you want to copy is selected. Then:

- Press **Edit Sequence**.
- Press COPY. The display shows:

```

COPY SEQ SEQUENCE-12
TO NEW LOCATION 25
*YES*
*NO *

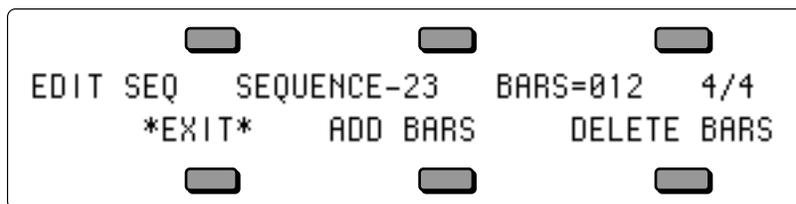
```

- Use the data entry controls to select a location for the copied sequence. Note that only -BLANK- sequencer locations will be available for selecting.
- Press *YES* to copy the sequence (or press *NO* to cancel). The new sequence will be given the same name as the original sequence. You can then rename it from the Edit Sequence/INFO page if you wish.

LENGTH — Add and Delete Bars from a Sequence

Though the length of the first track determines the length of the sequence, you can use the Add Bars and Delete Bars functions to add empty bars, starting from any bar within the sequence, or to remove any number of bars from the sequence.

From the Edit Sequence page, press LENGTH. The display shows:



This sub-page shows the name, number of bars, and time signature for the sequence, as well as the Add and Delete Bars commands.

ADD BARS

The Add Bars function lets you add any number of bars to the sequence up to a total sequence length of 999 bars. It consists of two steps: 1) you specify at which bar you want to start adding bars, and then 2) you select how many bars you want to add.

To ADD Bars to the selected sequence:

- Make sure the sequence to which you want to add bars is selected.
- Press **Edit Sequence**, and press LENGTH.
- Press ADD BARS — the display shows the following:



- Press the soft button above AT BAR ## on the display.
- Use the data entry controls to determine at which bar the new measures will be added. This can be any bar within the sequence:
 - > Selecting Bar 01 will cause bars to be added at the beginning of the sequence.
 - > Selecting the bar *after* the last bar of the sequence will cause bars to be added at the end of the sequence.
 - > Selecting any other bar will cause bars to be added starting from that point in the sequence.
- Press the soft button above ADD ## BARS.
- Use the data entry controls to select how many bars you want to add. You can add any number up to a total sequence length of 999 bars. Empty bars (no track data) will be added beginning from the bar selected in the previous step.
- Press *YES* to complete the command, or press *NO* to cancel.

DELETE BARS

The Delete Bars function lets you delete (or remove) any number of bars from a sequence, starting from any bar within the sequence.

This is handy when, for example, you record a first track which is perfect except that it runs to 5 Bars instead of 4. With this edit function you can easily chop off the extra bar.

To DELETE Bars from the selected sequence:

- Make sure the Sequence from which you want to delete bars is selected.
- Press **Edit Sequence**, and press LENGTH.

- Press DELETE BARS — the display shows the following:



- Use the data entry controls to determine at which bar you want to begin removing bars. This can be any Bar within the Sequence. Bars will be deleted from the beginning of the Bar you select here.
- Press the soft button above DELETE ## BARS.
- Use the data entry controls to select how many bars you want to delete.
- Press *YES* to complete the command, or press *NO* to cancel.

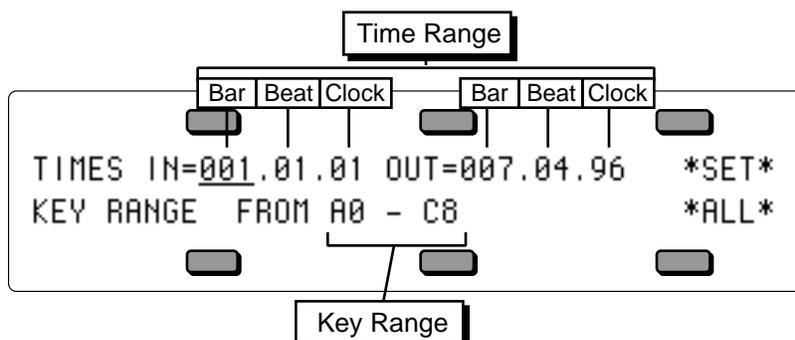
Sequence Bank Utilities

A new way to select sequences has been added to certain sequencer edit pages. When a sequence name parameter is selected on the Song Edit, Append Sequence, Copy Track or Merge Track pages, an LED above one of the bank buttons will flash to show where the indicated sequence is located. Pressing a **Bank** button will temporarily show the corresponding sequence bank page, and sequences may be selected using soft buttons. If the selection is valid, the page will then revert to the previous edit page with the new sequence name installed. In addition, you may select the destination Location for Copy Song or Copy Sequence by indicating a -BLANK- location on one of the bank pages. This will automatically install the corresponding location number and return to the copy command page.

Edit Track Page Parameters

Range Sub-Page — Setting the Time and Key Range

Within almost all track editing functions, you will find a parameter labeled RANGE. Pressing the soft button below RANGE takes you to a special sub-page where you can define the time and key range over which the track edit command will work. Data outside the defined range will be left alone. When you select RANGE from within a track edit function, the display shows:



- On the upper line of the display you can select and modify the *Time* range which will be affected by the edit function; on the lower line you select and modify the *Key* range.
- To set the time range, first press the soft button above IN to choose the beginning edit time, shown in Bars, Beats and Clocks. Adjust to the desired bar with the data entry controls. Press the same soft button again to advance the underline from Bar to Beat to Clock, etc. adjusting each as needed. Then press the soft button above OUT and repeat these steps to set the ending edit time.

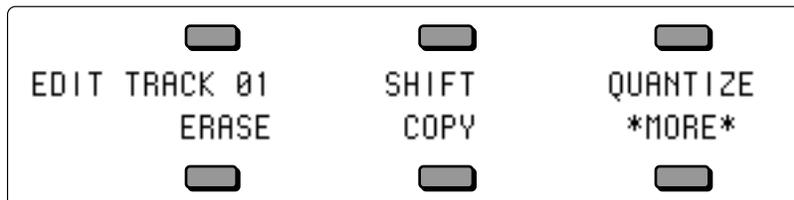
- To set the key range, press the soft button beneath the low and high keys, underlining the low key. Play the lowest note you want affected by the edit function; the underline switches to the high key. Play the highest key you want to be affected. The underline disappears, allowing you to play the keyboard without resetting the ranges every time you press a key. You can reset the range (if it's not correct) by pressing the soft button again, and playing the low and high keys. You can also set the key range using the data entry controls, and pressing the soft button again to move the cursor from the low to high key.
- Press *SET* to accept these edit ranges for the current track edit function. You will be returned to the edit function with the display reading RANGE=SET, or;
- Press *ALL* to bypass the edit ranges and have the track edit function affect the entire track. You will be returned to the edit function with the display reading RANGE=ALL.

Important:

The IN and OUT times specified in the Edit Track Range page are the same as the Edit Times found on the Locate sub-page and used by the Autopunch function. They are interactive — changing the IN or OUT times in either location will cause them to be changed in the other.

Track Edit Functions

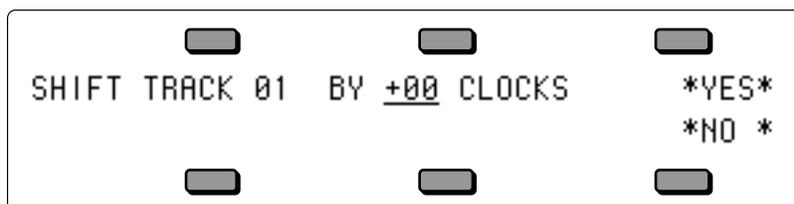
- Press the **Edit Track** button. The display shows:

**SHIFT**

Range: -96 to +96 (96 clocks=1/4 note)

This command will cause all the events in the track to be moved ahead or back in time by a specified number of clocks (1 clock=1/96 quarter note). You can use this to create a “lazy” or “pushed” feel in a track.

- Make sure the track you want to edit is selected.
- Press **Edit Track**, then select **SHIFT**. The display shows:



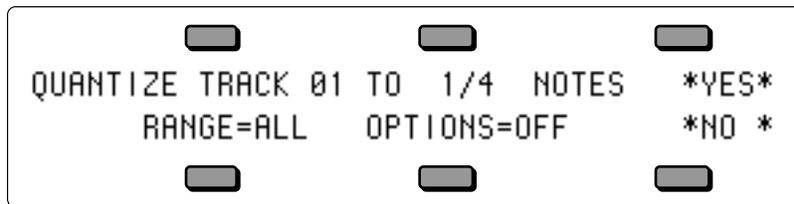
- Use the data entry controls to specify the amount the track is to be shifted. Positive values will move the events in the track ahead in time, toward the end of the sequence; negative amounts will shift the events back, toward the beginning.
- Press *YES* to execute the edit command (or press *NO* to cancel). After editing, the display shows the Audition Play/Keep page where you can audition the results of the edit before deciding whether to keep it or not.

QUANTIZE

Range: 1/4 to 1/64T

The Quantize (or auto-correct) function can take a less than perfect track and put it right on the beat. The TS-12 uses post-quantization — that is, you first record a track, then apply the quantization later as a track editing option. You can select any note value from 1/4 note up to 1/64 note triplets, and move all notes in the track directly onto the nearest beat of that value.

- Make sure the track you want to quantize is selected.
- Press **Edit Track**, then select **QUANTIZE**. The display shows:



- Use the data entry controls to specify the note value to which the track is to be quantized. Available values are:

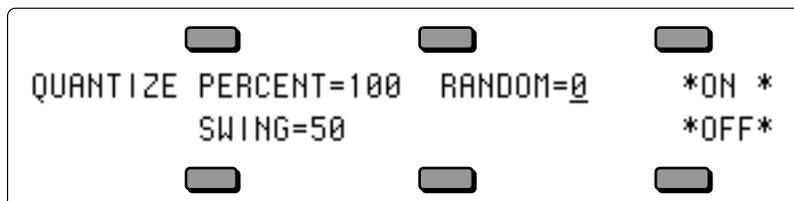
1/4 — quarter notes	1/16T — sixteenth note triplets
1/4T — quarter note triplets	1/32 — thirty-second notes
1/8 — eighth notes	1/32T — thirty-second note triplets
1/8T — eighth note triplets	1/64 — sixty-fourth notes
1/16 — sixteenth notes	1/64T — sixty-fourth note triplets
- If you wish to quantize a specific range rather than the entire track, press **RANGE** and set the time and/or key range on the Edit Track Range page, as shown earlier in this section. If not, leave it set to **RANGE=ALL**.
- Press ***YES*** to execute the **QUANTIZE** command (or press ***NO *** to cancel). After editing, the TS-12 returns with the Audition Play/Keep page where you can audition the results of the edit before deciding whether to keep it or not.

Options

Range: OFF or ON

The TS-12 allows you to define how you want to quantize your track. In other words, when you select the quantize options, you can select several different variables in quantizing your track. Using these variables can create a very live sounding sequence. When “**OPTIONS=OFF**,” all key events are quantized to the closest note value that was selected earlier. To select Options:

- Press the soft **OPTIONS** button. This takes you to the Options ON sub-page:

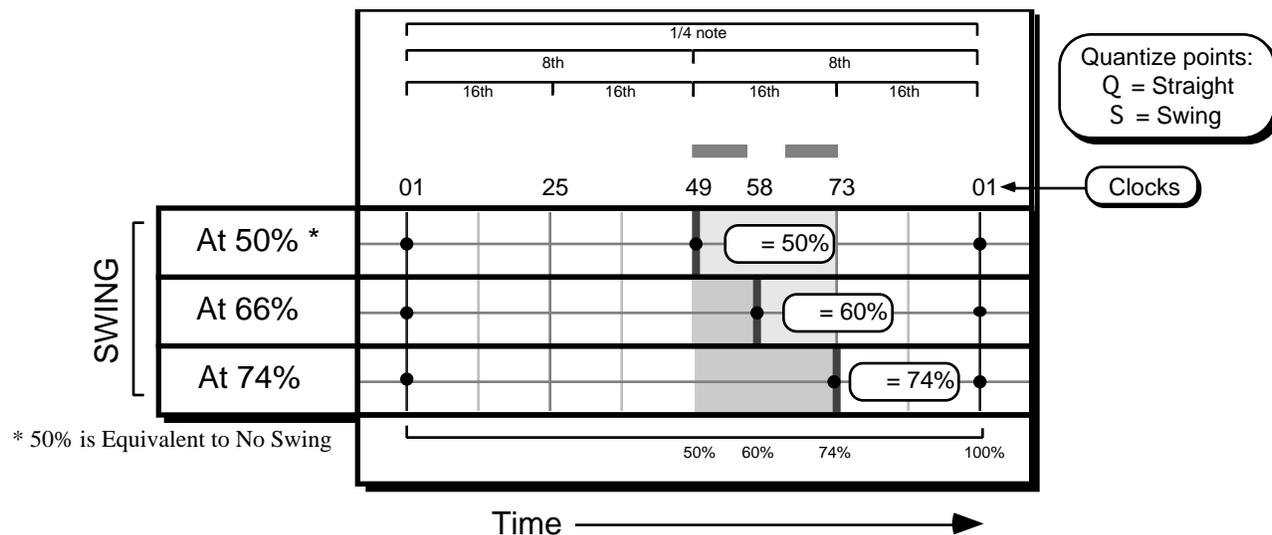


- On the Options page, you can set the levels of the Quantize **PERCENT**, **RANDOM**, and **SWING** amount using the **Data Entry Slider**. After setting these levels, to engage these parameters, press ***ON ***.
- If you do not want to use these features, press ***OFF***. This returns you to the previous display.
- Straight quantization will always take place when quantize options are set to “**OFF**,” even if the user has specified values for **PERCENT**, **RANDOM**, and **SWING**. The options will not have any effect until “**OPTIONS=ON**.”

The option switch defaults to **OFF** when the sequencer is initialized, but after that, the quantize option switch setting is remembered until changed again by the user.

SWING Range: 50 to 74%

When you specify a SWING percentage value, you are defining the offset amount that every second quantize point (known as the swing note) will be delayed. In keeping with the swing implementation in most MIDI sequencers, the SWING range is from 50% (the same as straight quantization) to 74% (a tick before the next higher note value). A setting of 66 is equivalent to setting the quantization to triplets. The following examples show what happens when the user quantizes to 1/8 notes with various settings of SWING. Q denotes every straight 1/8 note quantize point, while S denotes the swing eighth quantize point.



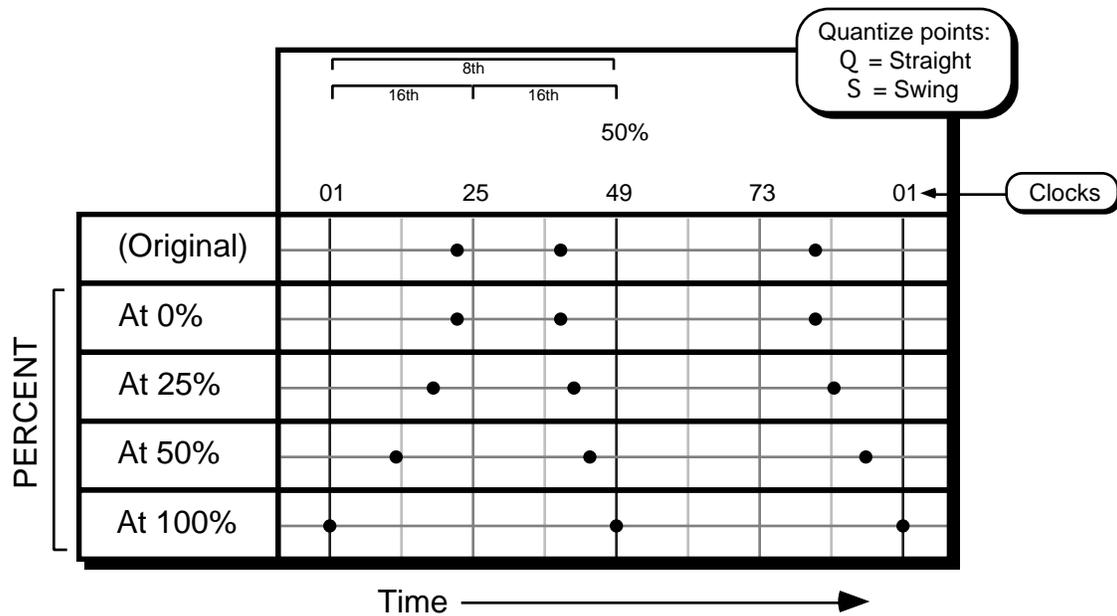
The SWING setting is the percentage of the time difference between the two Straight quantize points, and it is used to position the Swing quantize point. As the Swing setting increases from 50%, the Swing quantize point is moved closer to the following Straight quantize point.

The SWING percentage actually defines the point between the two straight quantize points. In other words, at 96 ppq, 60% swing means that between two quarter notes, the swing eighth will occur at the 60% mark, or at clock 58 (0.60 x 96). The default value for this parameter is 50% when the sequencer is initialized. Once it is changed, the last value is always remembered.

PERCENT Range: 000 to 100

While the Quantize Note Value and SWING parameters determine the position of the quantize points, the PERCENT and RANDOM parameters determine where the key events will be placed in relation to the quantize points. The PERCENT parameter specifies how much the key event will move toward the calculated quantize point. A PERCENT value of zero would mean that the key events would not move any distance toward the quantize point. A PERCENT value of 100 would mean that the key event would be placed exactly on the quantize point. A PERCENT value of 50 will move the event half way to the quantize point.

The following diagram illustrates this. Again, Q and S represent the straight quantize and swing quantize points respectively. The original source track is shown, followed by the quantized versions at 0, 25, 50, and 100% quantization.



In this example, QUANTIZE is set to 1/8th notes and SWING is set to 50%. Increasing the PERCENT setting moves the events closer to the quantize points.

Notice how increasing the quantize percentage tightens up the track timing. The default value for this parameter is 100% when the sequencer is initialized. Once it is changed, the last value is always remembered.

RANDOM

Range: 0 to 3

After the PERCENT parameter calculates the placement of the key event relative to the quantization points, the RANDOM parameter determines if, and how much, randomization should be applied to the key placement. The RANDOM parameter defines a “window of looseness” that the key event can fall into.

A RANDOM factor of 0 indicates that NO randomization will occur. A RANDOM factor of 3 indicates that the key event will be shifted anywhere from 0 to 3 clocks in either direction from the calculated key placement. Again, an example will illustrate this more clearly. This time we'll use an event list. For our example, we'll assume 1/4 note quantization with NO (i.e. 50%) swing, and a PERCENT factor of 50. The first column shows the original source track. The second column shows where the events will be placed if quantized with no randomization. The third and fourth columns show the range that the event will fall in with various degrees of randomization. Note that the placement of the key event is calculated first with NO randomization, then the random factor is applied.

ORIGINAL	with RANDOM=0	with RANDOM=1	with RANDOM=2
1.1.08	1.1.04	1.1.03 to 1.1.05	1.1.02 to 1.1.06
1.2.12	1.2.06	1.2.05 to 1.1.07	1.2.04 to 1.2.08
1.2.95	1.2.96	1.2.95 to 1.3.01	1.2.94 to 1.3.02
1.4.01	1.4.01	1.3.96 to 1.4.02	1.3.95 to 1.4.03

The RANDOM parameter defaults to zero when the sequencer is initialized. After that, the last value is remembered.

Using the Quantize Options

Percentage quantization can be used to “tighten up” a track without placing everything exactly on a quantize point. This can make loose tracks sound tighter without sounding mechanical. It's especially useful on passages where you want to play constantly ahead of or behind the beat. You can quantize the track to tighten up the looseness, yet still retain the rushed or laid back feel.

Keep in mind that percentage quantization can be done in stages. For example, quantize a track to 25% and keep it. Then later, if you decide you want it tighter still, quantize it again by 25%. Each time you perform a quantization, you will move the key events slightly closer to the quantize point.

Random quantization is useful for taking old tracks that have been quantized 100% and giving them a more human feel. This can be done by quantizing with the desired randomization factor. The higher the RANDOM factor, the looser the track will become (since the tracks have previously been quantized to the 100% quantize points, the PERCENT parameter will have no effect). Tracks that have not been quantized can be randomized as well. If your desired effect is simply to loosen a current track, select a quantize PERCENT of zero, and quantize with the desired randomization. This will shift each event in the track within a few clocks of its original place, but will not necessarily move it towards the quantize point.

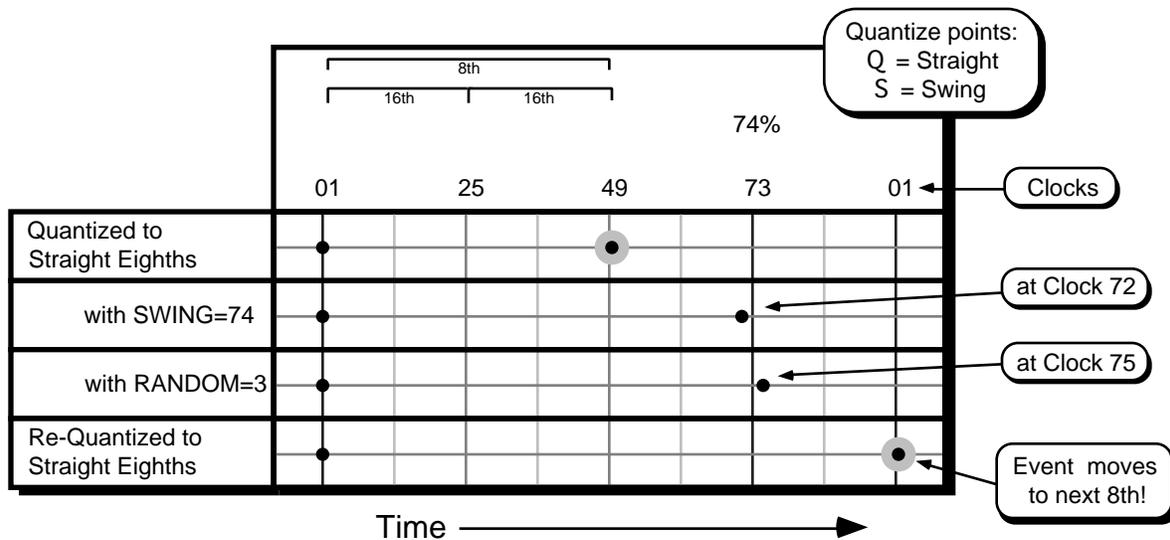
In addition, the RANDOM parameter inside the TS-12 “reseeds” itself. This means that if you quantize two identical tracks with randomization, you will get different results. Also, if you set the PERCENT parameter to zero, you can randomize a track, keep the new track, and randomize it again to get things progressively looser.

Although PERCENT, RANDOM, and SWING are interrelated, you do not have to use all of them when selecting options. By setting these parameters to their default values (PERCENT=100 - RANDOM=0 - SWING=50), you can use any one or combination of these options to quantize your tracks.

Important:

An event can be randomized and end up closer to a different quantize point. This could be a problem if you later decided to go back to a straight, no-frills quantization. This is not a fault of the quantization feature, but simply what can happen with randomization. The random factor is purposely kept low to prevent this from happening, however, there are cases where this can occur. One example would be successive randomization with the PERCENT parameter set to zero. Another instance involves using combinations of a high SWING parameter with a high RANDOM factor.

For example, let's say you have a hi-hat track that's already been quantized to straight eighths. Now you decide to give it a large swing feel, so you set SWING to 74. Any event that was at clock number 49 (a straight eighth note) would move to clock 72. But if you also specified a RANDOM of 3, the event may move as far as clock 75. Now let's suppose you keep this track, but then later on decide that you don't want a swing feel. So you setup a straight 1/8 note quantize. Only this time, the event that originally was at clock 49 is now at clock 75, so it would be moved to the next quantize point at clock 1 in the next beat (since that's the closest quantize point to that event). If you audition the track and hear that the swing event has moved up to the next quantize point, then you should keep the old track, shift the track by -3 clocks (to put the swing note closer to the original straight eighth point) then requantize with no swing to get all events back on the straight eighth points.

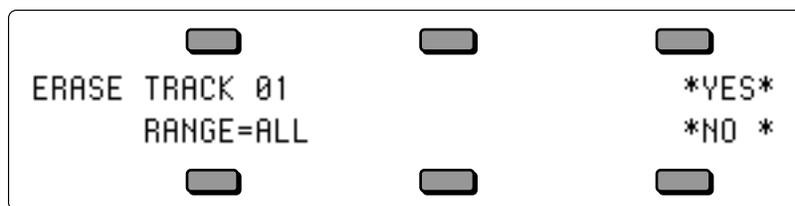


In this example, QUANTIZE is set to 1/8th notes, SWING is set to 74% and RANDOM set to 3, the event can be moved beyond the Swing Quantize point. In this case, a subsequent straight eighth quantize will move the event to the eighth note after the one it was initially on.

ERASE

This command will erase notes, controllers and all other data from the entire track, or from a given range if you so specify.

- Make sure the track you want to erase is selected.
- Press **Edit Track**, then select ERASE. The display shows:

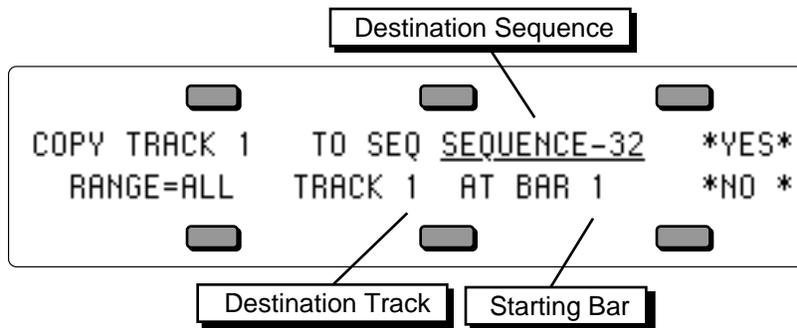


- If you wish to erase a specific range rather than the entire track, press RANGE and set the time and/or key range on the Edit Track Range page, as shown earlier in this section. If not, leave it set to RANGE=ALL.
- Press *YES* to execute the edit command (or press *NO* to cancel). After editing, if a range was specified, the TS-12 returns with the Audition Play/Keep page where you can audition the results of the edit before deciding whether to keep it or not. If the range was ALL, there is no audition.

COPY

This command will copy all or part of the current track (the source track) to another track. The destination track can be in the same sequence or in a different sequence.

- Make sure the track you want to copy is selected.
- Press **Edit Track**, then select COPY. The display shows:



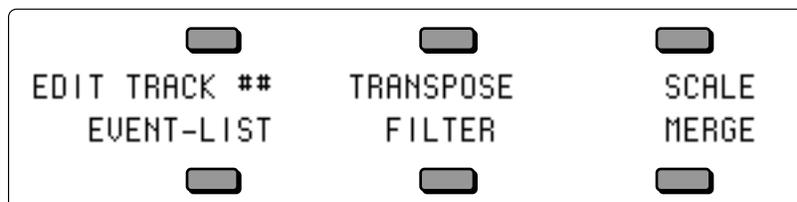
- If you want to copy the source track to a different sequence, select the destination sequence by using the data entry controls to choose the one you want. Notice that only predefined sequences can be selected. The default is the current sequence, the one the source track is in.
- Select the destination track and use the data entry controls to select a track for the source track to be copied into.
- Press the soft button beneath the destination track again to move the underline to the starting bar. The data from the source track will be copied into the destination track starting from the beginning of the bar specified here. The default is bar 1, the beginning of the track.
- If you wish to copy a specific range rather than the entire track, press RANGE and set the time and/or key range on the Edit Track Range page, as shown earlier in this section. If not, leave it set to RANGE=ALL.
- Press *YES* to execute the copy command (or press *NO* to cancel). After editing, the TS-12 returns with the Audition Play/Keep page where you can audition the results of the edit before deciding whether to keep it or not.

Note: The Copy Track function behaves differently depending on whether or not there is already recorded data on the destination track:

- If the destination track is empty (no track data), both the track data *and* all the track parameters (Mix, Pan, Timbre, etc.) from source track will be copied to the destination track.
- If the destination track already contains recorded track data, after you press *YES* to copy the track, the display will warn: DATA ON DESTINATION TRACK WILL BE LOST. Press *YES* to proceed, or press *NO* to exit and select a different destination track.
- After you press *YES*, the display asks COPY TRACK PARAMETERS TOO?
 - > Press *YES* to copy both the recorded track data *and* all the track parameters to the destination track.
 - > Press *NO* to copy only the recorded track data to the destination track, leaving the values of all the track parameters as they were before.

MORE — Additional Track Edit functions

Pressing *MORE* from the Edit Track page displays a sub-page which contains five additional track editing options. Pressing the Edit Track button twice will also take you directly to this page. Press *MORE*. The display shows:

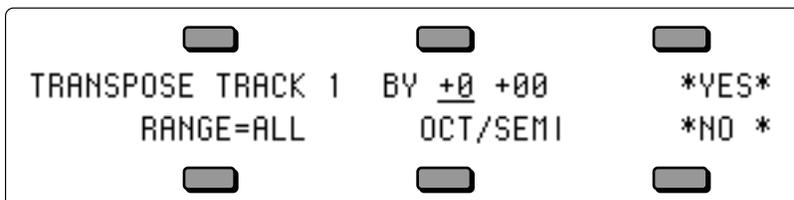


The track editing functions contained on this sub-page are as follows:

TRANSCOPE

The Transpose function will raise or lower the notes in the track by a specified number of octaves and/or semitones. In addition to simply transposing the entire track, you can use the transpose function to re-map existing drum and percussion tracks for use with programs and instruments that have different key layouts, using the key range function to transpose a single key.

- Make sure the track you want to transpose is selected.
- Press **Edit Track** twice (or press *MORE* from the Edit Track page), then select TRANSCOPE. The display shows:



- Use the data entry controls to specify the amount the track is to be transposed:

Octave

Range: -4 to +4 octaves

The first number (which is already selected) sets the octave amount.

Semitone

Range: -12 to +12 semitones

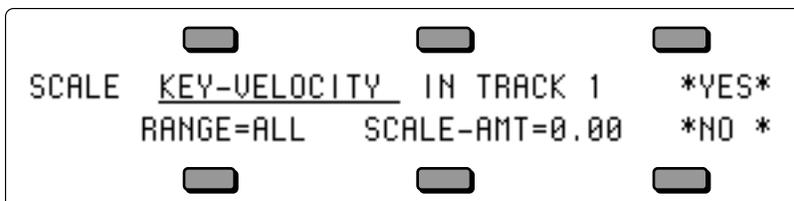
Press the soft button above the transpose amount again to move the underline to the semitone amount and adjust that.

- If you wish to transpose a specific range rather than the entire track, press RANGE and set the time and/or key range on the Edit Track Range page, as shown earlier in this section. If not, leave it set to RANGE=ALL.
- Press *YES* to execute the edit command (or press *NO* to cancel). After editing, the TS-12 returns with the Play/Keep page where you can audition the results of the edit before deciding whether to keep it or not.

SCALE

The Scale command lets you increase or decrease the level of any controller information in the track by a specified amount. You could use this function, for example, to tame some over-zealous mod wheel work, or to increase the key velocity of all the notes in the track by some amount.

- Make sure the track you want to edit is selected.
- Press **Edit Track** twice (or press *MORE* from the Edit Track page), then select SCALE. The display shows:



- Use the data entry controls to choose which type of controller(s) you would like to scale. The following event types can be scaled:

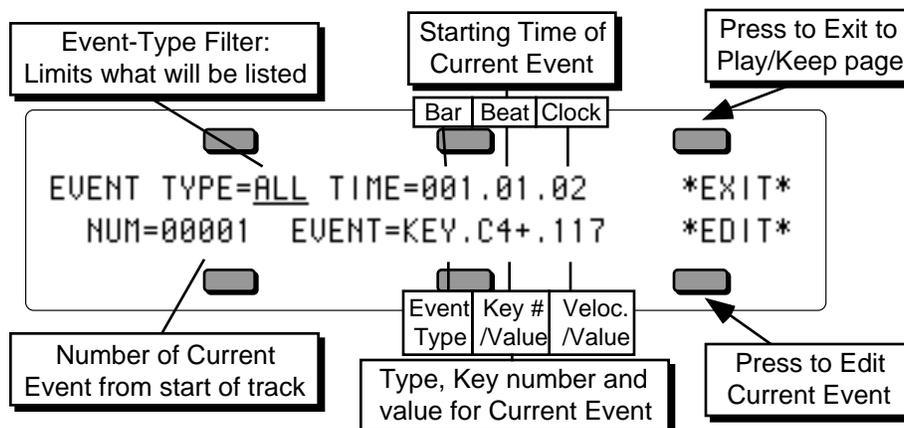
KEY-VELOCITY — Note-On Velocity
 CNTL-1.MODWHL — Mod Wheel
 CNTL-4.PEDAL — Foot Pedal
 CNTL-7.VOLUME — Volume Pedal
 CNTL-10.PAN — Track or MIDI Pan
 CNTL-64.SUSTN — Sustain Foot Switch
 CNTL-66.SOSTU — Sostenuto Foot Switch
 CNTL-12.FX-SW — Effect Mod Foot Switch
 CNTL-70.PSEL — Patch Select Buttons
 CNTL-71.TIMBR — Track Timbre Controller
 CNTL-72.RELS — Track Release Time Controller
 CNTL-73.ATTAK — Track Attack Time Controller
 CNTL-74.BRITE — Track Brightness Controller
 CNTL-75.RATE — Track Rate Controller (LFO Rate and/or Wave-List Duration)
 CNTL-XX.XCTRL — Track External MIDI Controller
 ALL.CONTROLRS — All Controllers
 CHAN-PRESSURE — Channel (mono) Pressure
 MIXDOWN-VOLUME — Mixdown Volume
 MIXDOWN-PAN — Mixdown Pan
 TEMPO — Tempo Track Events (note that SCALE will have no effect on TEMPO events)
 PITCH-BEND — Pitch Bend Wheel

- If you wish to scale a specific range rather than the entire track, press RANGE and set the time and/or key range on the Edit Track Range page, as shown earlier in this section. If not, leave it set to RANGE=ALL.
- Press *YES* to execute the Scale command (or press *NO* to cancel). After editing, the TS-12 returns with the Audition Play/Keep page where you can audition the results of the edit before deciding whether to keep it or not.

EVENT-LIST

The Event List function provides you with an extremely powerful tool for viewing and editing each event in the track. Every key event, controller change and program change can be individually located and edited.

- Make sure the track you want to edit is selected.
- Press **Edit Track** twice (or press *MORE* from the Edit Track page), then select EVENT-LIST. The display shows:



EVENT-TYPE

Controls which types of events will be shown as you scroll up through the events in the track. When set to ALL, every event in the track will be listed. On the other settings, some types of events will be left out of the list — when the Event Number (below) is changed, the display will jump directly to the next event of the type shown, skipping other types. The Event Types which can be selected here are:

MOD — Mod Wheel
 PED — Foot Pedal
 VOL — Volume Pedal
 PAN — Track or MIDI Pan
 SUS — Sustain Foot Switch
 SOS — Sostenuato Foot Switch
 FXS — Effect Mod Foot Switch
 PSL — Patch Select Buttons
 TMB — Track Timbre Controller
 REL — Track Release Time Controller
 ATK — Track Attack Time Controller
 BRT — Track Brightness Controller
 RAT — Track Rate Controller (LFO Rate and/or Wave-List Duration)
 XCC — XCTRL: Track External MIDI Controller
 CNT — All Controllers
 CPS — Channel (mono) Pressure
 MXV — Mixdown Volume
 MXP — Mixdown Pan
 TMP — Tempo Track events
 BND — Pitch Bend Wheel
 KPS — Poly-Key Pressure
 PRG — Program Changes and Bank Selects
 KEY — Note Events only; no Controllers
 ALL — All Events of all types

TIME

Shows the current time in terms of Bar, Beat and Clock. These three TIME fields can be individually selected by repeated presses of the soft button. Use the **Up/Down Arrows** to step ahead or back in time by bars, beats or clocks, depending on which field is selected.

NUM — Event Number

When this field is selected, you can use the data entry controls to step ahead or back in time among the events in the track to find the one(s) you want to edit. When you press the **Up Arrow** button, it will advance to the next event of the type specified in Event Type. Moving the **Data Entry Slider** will scroll quickly through all the events in the track. You will hear the notes in the sequence play as you step through the track.

EVENT

This shows the type and value of the current event. The first segment of this readout is always the Event Type. For Key events Poly-Key pressure events, and Program Change events there are two additional segments; for all other event types there is one additional segment:

- On Key events, the display shows: EVENT=KEY.C4.115. The three segments represent Event Type; Key Number; and Velocity.
- On Poly-Key pressure events, the display shows EVENT=KPS.C4.115. The three segments represent Event Type; Key Number; and pressure Value.
- On Program Change events, the display shows: EVENT=PRG.000.000.B. The last three segments represent Event Type, Program Number, and Bank Select Number (followed by a "B").
- For all other Event types, the display shows the Event Type and the Value.

- Time locations with no event are shown as EVENT=***.000.

Note: For TMP (tempo event type) the value is a percentage increase or decrease of the tempo(s) of the sequences that make up the song: when TEMPO=+00, the ACTUAL value shows the actual tempo of the sequence corresponding to the song step that is currently playing.

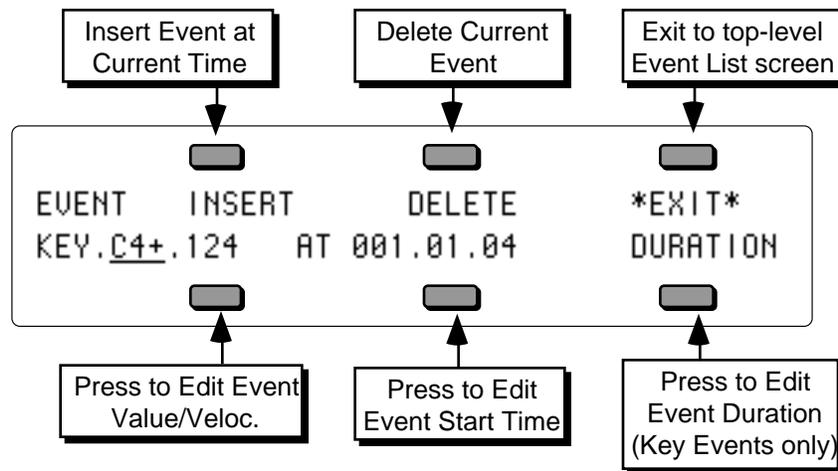
EXIT

This exits Event List mode. If you have made any changes to the track you will be put on the Play/Keep page where you can audition the changes before deciding whether to keep them.

EDIT

Pressing EDIT displays the event editor sub-page which shows the selected event and its event number with the time that it occurs, and in the case of events with duration, the end time of the event as well.

Once you have selected an event to edit using the Event Number parameter (NUM), press *EDIT*. The display shows:



INSERT

Pressing INSERT will insert an event of the current Event Type at the time showing on the display. This option is not available when the Event Type is ALL (all events) or CNT (all controllers).

DELETE

This will remove the current event from the track.

EXIT

Pressing *EXIT* returns you to the main Event List page.

Value

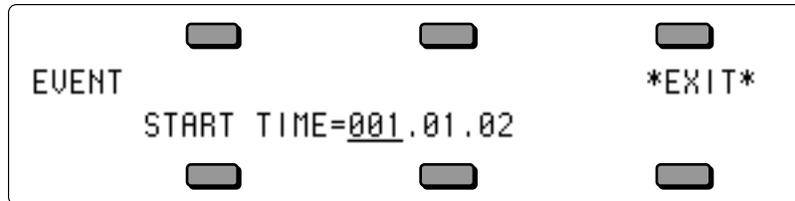
To edit the VALUE of the current Event (the key number and velocity of a key event; the value from 0 to 127 of a controller change; or a program change number, etc.), press the lower-left soft button to select the value, then use the data entry controls to change it. For Key events, Poly-Key pressure events, and Program Change events, pressing the soft button again will select the second value segment for editing.

Event Starting Time

Seq Values: Bar, Beat, and Clock

Song Values: Step, Repeats, Bar, Beat, and Clock

To change the STARTING TIME of the current event, press the soft button below the time. The display shows:



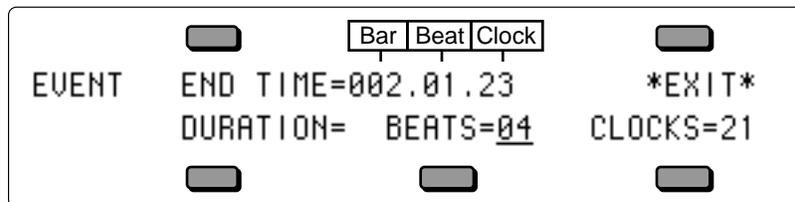
Use the data entry controls to change the start point of the event, pressing the soft button beneath the time to move the cursor between Bar, Beat, and Clock. When you have the starting time that you want showing on the display, press *EXIT* to return to the Event List page with the event on the new time.

Note: When a Song track is selected, an additional two segments are added to this readout, and the time readouts on the other Event List pages. In song mode, the display shows Step.Rep.Bar.Beat.Clock. For example, Step 1, Rep 2, Bar 4, Beat 3, Clock 76 would appear as:

START TIME=01.02.004.03.76

Duration

For Key Events only, you can change the length of the event (the time between when the key is struck and it is released). From the Event Edit sub-page press the soft button below DURATION. The display shows:



On the upper line of the display you can edit the end time of the event, using the data entry controls to change the end point and pressing the soft button above the time to move the cursor between Bar, Beat, and Clock.

On the lower line of the display, you can edit the actual duration of the event, expressed in terms of how many beats and clocks the event lasts. You can select BEATS=##, edit that and then select CLOCKS=## and edit that.

The upper and lower lines of this sub-page are interactive — editing the End Time on the upper line will cause the duration on the lower line to change, and vice versa.

When you have the duration that you want showing on the display, press *EXIT* to return to the Event Edit sub-page.

Auditioning Event Edit Changes

If you press *EXIT* to leave the Event List function without having made any changes in the track, you will simply be returned to the Edit Track page.

If you do change anything in the track, when you press *EXIT* you will be placed on a special version of the Audition Play/Keep page, where you can audition the new track and the original before deciding to either keep the new track, keep the old track *or* return to the Event Editor to edit some more. The display shows:



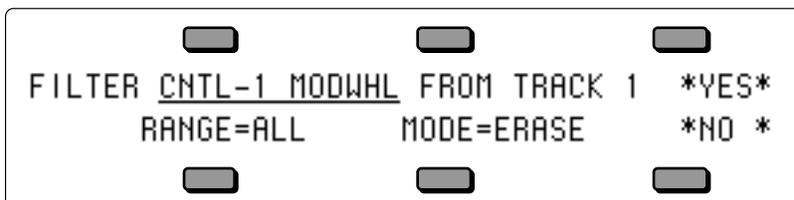
- Press KEEP ORIGINAL to exit to the Edit Track page, leaving the track as it was before you began editing.
- Press KEEP NEW to save the changes you have made to the track in Event List mode, replacing the original track in memory. Or,
- Press EDIT EVENTS to re-enter the Event List mode with the changes you have made so far intact, but retaining the option of keeping the original track later on.

When you have a song track on which the recorded data is shorter than the length of the actual song steps, and you try to add any type of event after the end of the recorded data, you will momentarily see the following error message: EVENT TIME PAST END OF RECORDED TRACK. To remedy the problem, your song track data needs to be the same length as the song steps. Set the RECORD-MODE=ADD; Press **Record** and **Play**, and let the song track run for the entire length of the song (without recording any data). On the Audition page, select KEEP NEW TRACK, and your song track will now be the same length as the Song Steps.

FILTER

The Filter command can be used to selectively remove events (such as notes, controllers and program changes) from a track, or to copy selected events to a different track for further editing. The Filter command has two modes, Erase and Copy. Depending on which mode is selected, it will either remove the specified events from the track, or simply copy them to another track, leaving the original track intact.

- Make sure the track you want to filter is selected.
- Press **Edit Track** twice (or press *MORE* from the Edit Track page), then select FILTER. The display shows:

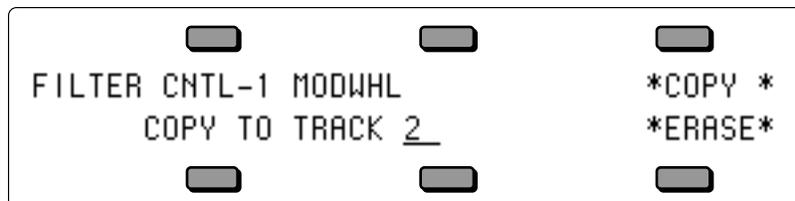


- Use the data entry controls to choose which type of events you would like filtered from the track. The following event types can be filtered:

CNTL-1.MODWHL — Mod Wheel
 CNTL-4.PEDAL — Foot Pedal

CNTL-7.VOLUME — Volume Pedal
 CNTL-10.PAN — Track or MIDI Pan
 CNTL-64.SUSTN — Sustain Foot Switch
 CNTL-66.SOSTU — Sostenuto Foot Switch
 CNTL-12.FX-SW — Effect Mod Foot Switch
 CNTL-70.PSEL — Patch Select Buttons
 CNTL-71.TIMBR — Track Timbre Controller
 CNTL-72.RELS — Track Release Time Controller
 CNTL-73.ATTAK — Track Attack Time Controller
 CNTL-74.BRITE — Track Brightness Controller
 CNTL-75.RATE — Track Rate Controller (LFO Rate and/or Wave-List Duration)
 CNTL-XX.XCTRL — Track External MIDI Controller
 ALL.CONTROLRS — All Controllers
 CHAN-PRESSURE — Channel (mono) Pressure
 MIXDWN-VOLUME — Mixdown Volume
 MIXDOWN-PAN — Mixdown Pan
 TEMPO — Tempo Track events
 PITCH-BEND — Pitch Bend Wheel
 KEY-PRESSURE — Poly-Key Pressure
 PROGRAM-CHNG — Program Changes and Bank Selects
 KEY-EVENTS — Note Events only; no Controllers

- If you wish to filter a specific range rather than the entire track, press RANGE and set the time and/or key range on the Edit Track Range page, as shown earlier in this section. If not, leave it set to RANGE=ALL.
- Press MODE=ERASE. This displays a special sub-page where you select the Filter Mode:



- > If you want to copy the data to another track, select a destination track and then press COPY. You are returned to the Filter page, the display reading MODE=COPY.
- > If you want to permanently remove the data from the track, simply press ERASE. You are returned to the Filter page, the display reading MODE=ERASE. (Note that Erase mode is the default whenever you enter the filter command, so if you want Erase mode you can skip this step.)
- Press *YES* to execute the filter command (or press *NO* to cancel). After editing, the TS-12 returns with the Audition Play/Keep page where you can audition the results of the edit before deciding whether to keep it or not.

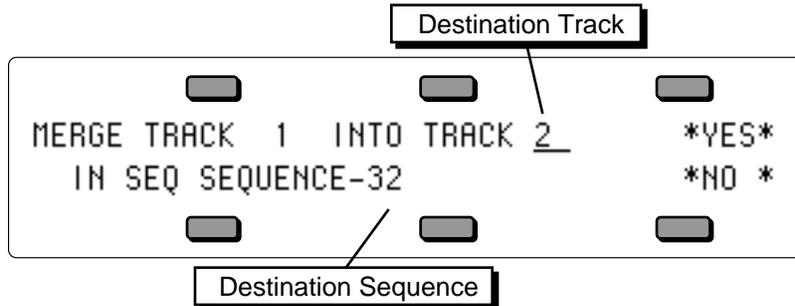
Note: If you chose Copy mode, the TS-12 returns with the new track (the copy) selected. If you wanted to copy and then erase the data, you must first reselect the original track and then repeat the above procedure, using Erase mode.

Note: The Copy mode of the Filter command works just like the Copy Track command: Data on the destination track will be erased.

MERGE

This command will take the data in the selected track and merge, or combine, it together with that of another track. The destination track can be in the same sequence or in a different sequence from the source track. Note that the source sequence is not altered or erased by this process.

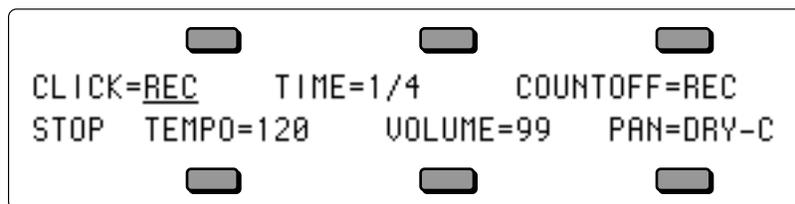
- Make sure the track you want to merge (the source track) is selected.
- Press **Edit Track** twice (or press *MORE* from the Edit Track page), then select MERGE. The display shows:



- Press the soft button above the destination track and use the data entry controls to select a track for the source track to be merged into.
- If you want to merge the source track with a track in a different sequence, select the destination sequence and use the data entry controls to choose the one you want. The default is the current sequence, the one the source track is in.
- Press *YES* to execute the merge command (or press *NO* to cancel). After editing, the TS-12 returns with the Audition Play/Keep page where you can audition the results of the edit before deciding whether to keep it or not.

Click Page

Pressing the Sequencer **Click** button displays a page containing parameters which control the metronome functions of the sequencer.



CLICK Range: OFF, ON, or REC

Controls whether or not the click will be heard.

- OFF — the click will not be heard in Play or Record modes
- ON — the click will be heard whenever the sequencer is running
- REC — the click will be heard only when the sequencer is in Record mode, not when in Play

TIME Range: 1/2 to 1/32T notes

Sets the note value of the metronome click.

COUNTOFF Range: OFF, ON, REC, QUIET

This determines whether playing and/or recording sequences and songs will be preceded by a 1-bar countoff.

- OFF — no countoff will occur in Play or Record modes. The song or sequence will begin as soon as **Play** (or **Record/Play**) is pressed.
- ON — a one bar countoff plays before the sequence or song begins to play.
- REC — a one bar countoff will occur in Record mode only.

- QUIET — the countoff will occur in Play or Record modes without the click.

TEMPO (Tap Tempo)

Seq Range: 25 to 250 BPM, or EXT, Song Range: -64 to +63

Sets the tempo of the current sequence or song. On any of the three pages where tempo appears (Click, Sequencer Control, and Locate), the soft button nearest the TEMPO field can be used to “tap” in the tempo. If the field is already selected, tapping on the soft button at the correct rate for the desired tempo (based on the metronome settings on the click page) will update the tempo to the newest value. When CLOCK=MIDI on the Sequencer Control page, this field will read TEMPO=EXT to indicate that the tempo is controlled by incoming MIDI clocks. When a song is selected, the range is expressed as a percentage of the sequence tempo — changing the song tempo offset automatically adjusts the tempo of each the sequences in the song by a percent, within the legal limits of 25-250 BPM. When TEMPO=+00 the sequences in the song will play at their designated tempo.

When a Song Tempo Track is selected, editing this value will record tempo change events.

VOL

Range: -50 to +14 dB

Controls how loud the metronome click will sound.

PAN

Range: described below

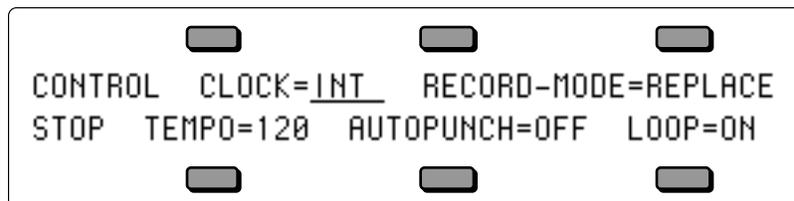
Controls the stereo position of the click, and allows it to be sent out of the Main or AUX Outputs.

- DRY-L, DRY-R and DRY-C will send the click (without effects) to the Main Outputs, to the left only, right only or center respectively.
- AUX-L, AUX-R and AUX-C will send the click directly to the AUX Outputs, to the left only, right only or center respectively.

Sequencer Control Page

The **Sequencer Control** page displays contains parameters which control the basic operation of the sequencer. This page consists of three sub-pages. The settings for the parameters on these pages are saved with the 60-SEQ/SONGS file type.

- Press **Sequencer Control**. The display shows:

**CLOCK**

Range: INT or MIDI

This parameter selects the clock source for the sequencer.

- INT — Selects the TS-12's own internal clock to run the sequencer. The TS-12 features 96 ppq (pulses per quarter-note) resolution for extremely accurate recording.
- MIDI — Selects external MIDI clocks as the sequencer clock source. Use this setting if you want to use another device (such as a computer sequencer or drum machine) as the master clock source and sync the TS-12 to it. Whenever CLOCK=MIDI, the tempo display will read TEMPO=EXT to indicate that the TS-12 is syncing to an external clock source.

When CLOCK SOURCE= MIDI, pressing the **Record** button puts the TS-12 into standby MIDI sync record. The MIDI indicator light will flash and the display will show WAITING... Recording will begin with the first MIDI clock received after a MIDI Start command. If the **Stop•Continue** button is pressed before a MIDI Start command is received, the TS-12 waits five seconds before stopping.

RECORD-MODE Range: REPLACE, ADD, LOOPED, or MIXDOWN

Selects between the three recording modes for the sequencer.

- **REPLACE** — Anything recorded into an existing track will replace the data that was in the track previously. The sequencer will stop recording after one time through the sequence or song and will enter Audition/Play mode.
- **ADD** — New data recorded into an existing track will be added to (or merged with) data already in the track — the existing data will be left intact. Again, the sequencer will exit record after one time through the sequence or song and enter Audition/Play.
- **LOOPED** — Like ADD mode, new data recorded into an existing track will be added to (or merged with) data already in the track. However, when RECORD-MODE=LOOPED, the sequencer will remain in Record for as many times as you play the song or sequence through (rather than dropping out of Record after one time through). Think of this as “drum machine mode” — as long as the sequence/song keeps playing, you can keep adding parts each time around.
- **MIXDOWN** — This mode is only available when a song is selected, and is used to record dynamic Volume and Pan changes into sequence and song tracks. When RECORD-MODE=MIXDOWN the TS-12 will record *only* changes made on the Volume and Pan pages in the Track Parameters section. Notes, controllers, program changes, etc. will *not* be recorded in this mode.

Depending on the setting of the EDIT TRACKS parameter on the next sub-page (see below) you can mix down either the song tracks or sequence tracks over the length of the song.

TEMPO (Tap Tempo) Seq Range: 25 to 250 BPM, or EXT, Song Range: -64 to +63

Sets the tempo of the current sequence or song. On any of the three pages where tempo appears (Click, Sequencer Control, and Locate), the soft button nearest the TEMPO field can be used to “tap” in the tempo. If the field is already selected, tapping on the soft button at the correct rate for the desired tempo (based on the metronome settings on the click page) will update the tempo to the newest value. When CLOCK=MIDI, this field will read TEMPO=EXT to indicate that the tempo is controlled by incoming MIDI clocks, and cannot be edited.

When a song is selected, the range is expressed as a percentage of the sequence tempo — changing the song tempo offset automatically adjusts the tempo of each the sequences in the song by a percent, within the legal limits of 25-250 BPM. When TEMPO=+00 the sequences in the song will play at their designated tempo.

When a Song Tempo Track is selected, editing this value will record tempo change events.

AUTOPUNCH Range: OFF or ON

When overdubbing a track, this extremely powerful feature will automatically enter and exit record mode at predetermined times which you specify. You can play along with the track and have the TS-12 “punch” in and out for you like an invisible engineer. We refer to the points at which recording will begin and end as the *Edit Times* and they are set on the second sub-page of the Locate Page.

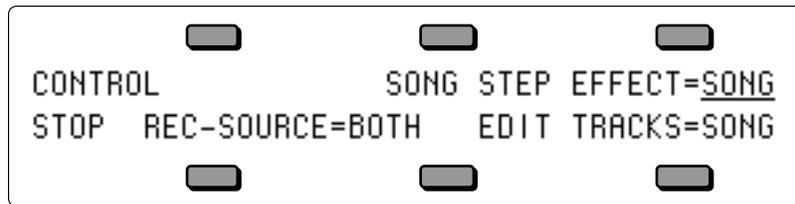
- **ON** — the TS-12 uses the Edit Times specified on the Locate sub-page for entering and exiting record state.
- **OFF** — normal recording without using Edit Times.

LOOP Range: OFF or ON

This parameter controls whether or not the sequence or song will loop. The setting of this control is remembered for each sequence and song.

- **ON** — the sequence or song will play continuously, looping back to the beginning when it reaches the end.
- **OFF** — the song or sequence will not loop, it will play once and stop.

- Press **Sequence Control** again to display the second sub-page:



SONG STEP EFFECT Range: SEQ or SONG

This controls which effect(s) will be used while a song is playing — those from each individual sequence or a single “override” effect saved with the song. A song contains a series of sequences which will play in order. Each sequence has its own effect. When switching from one sequence to another in the course of a song, there can be a momentary “glitch” of the sound as the effect for the new sequence is loaded. This can be avoided by setting this parameter to SONG STEP EFFECT=SONG so that the entire song will use the same effect.

- SEQ — the individual sequence effects will be selected as the sequences are played.
- SONG — the song effect will override the individual sequence effects.

REC-SOURCE Range: BOTH, KEYBD, MIDI, or MULTI

This parameter determines what will be recorded when the MIDI mode is MULTI — data from the keyboard, from incoming MIDI, or both. Setting this parameter to MIDI is useful if you want to send data from the TS-12 to a MIDI processor, then record only the incoming data coming back from the processor. This parameter only has an effect in MULTI mode; in POLY or OMNI modes the sequencer always records both.

- BOTH — The sequencer will record data received either from the keyboard or from MIDI on the track's MIDI channel.
- KYBD — The sequencer will record data only from the keyboard.
- MIDI — The sequencer will record only data received from the MIDI on the track's MIDI channel.
- MULTI — this setting allows you to record data onto multiple TS-12 tracks simultaneously, but only from MIDI. This is most useful for recording tracks sent from external sequencers or played from guitar controllers.

Note: The TS-12 must be set to receive data from MIDI in Multi mode (MODE=MULTI on the MIDI Control page) in order for this feature to work correctly.

It is possible to record multi-track sequences from the keyboard, but only if you set track status to MIDI-LOOP for each of the active (primary and layered) tracks and then set up a MIDI loop (by connecting MIDI Out to MIDI In). This procedure is a bit tricky, and should only be attempted if you have a good understanding of the system. See *Section 10 — Understanding the Sequencer* for information on recording into the TS-12 sequencer in a MIDI loop.

Note: With the SQX-70 installed, the sequencer can record over 97,00 notes. However the sequencer record buffer is of a limited size, and can only record 16, 00 notes at one time. As a result, you may see an OUT OF MEMORY message if you exceed the size of the record buffer. (this is most common in multi-track record). If this occurs, try editing the incoming data into several smaller sequences; then, once recorded into the TS-12 sequencer, append them together.

EDIT TRACKS

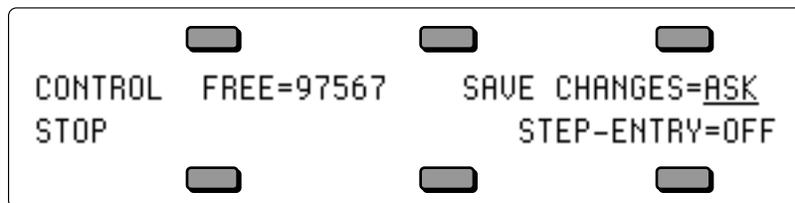
Range: SEQ or SONG

This determines which set of tracks will be displayed on the track parameter pages when a song is selected. It also determines whether song or sequence tracks will be affected by volume or pan changes when you select RECORD MODE=MIXDOWN (see above). When incoming MIDI is received, the setting of this switch determines whether the sounds on the sequence or the song tracks will play. The setting of this switch is saved with each song.

- SEQ — the sequence tracks from the current song step will be displayed. When EDIT TRACKS=SEQ and you press **Seq/Song Tracks 1-6** or **7-12**, the LED above the button will flash to remind you that you are looking at the tracks from the sequence currently playing and not at the song tracks. The sequence tracks will receive via incoming MIDI.
- SONG — the song tracks will be displayed when a song is selected. The song tracks will receive via incoming MIDI.

Tip: When you are working with a song, you may want to switch back and forth between the Song and Sequence tracks without having to go to the Sequencer Control page. There is a shortcut for toggling between EDIT TRACKS=SEQ and EDIT TRACKS=SONG. While on either of the Seq/Song Tracks pages, *rapidly* double-click the **Seq/Song Tracks 1-6** or **7-12** button. The LED above the tracks button flashes when you are looking at sequence tracks; it remains solidly lit when the song tracks are displayed.

Press **Sequencer Control** a third time to display the third sub-page:

**FREE**

Range: (read only)

This shows the number of available *events* in sequencer memory. This read only parameter is informational and cannot be selected or edited.

SAVE CHANGES

Range: NO, ASK, or AUTO

This parameter turns the SAVE CHANGES prompt on or off when switching between sequences and/or songs.

- NO — when SAVE CHANGES=NO, you can edit any of the Track Parameters, replace the sound on a track, etc. and the changes will be “forgotten” as soon as you select a new sequence or song. The SAVE CHANGES prompt will not be displayed. This mode is helpful when you are not sequencing, but have edited a sequence or song, and don't want to be slowed down by the SAVE CHANGES prompt. Recording any new track data, however, will automatically reset this parameter to ASK.
- ASK — when SAVE CHANGES=ASK, if you edit any of the Track Parameters, replace the sound on a track, etc. and then select a different sequence or song, you will be asked if you want to save those changes. This is the default setting.
- AUTO — when SAVE CHANGES=AUTO, all changes made to any of the Track Parameters, or track sound assignments are made permanent when you select another sequence or song. AUTO is similar to ASK, except the SAVE CHANGES prompt is not displayed, and assumes that you answered *YES*. Recording any new track data will *not* automatically reset this parameter to ASK — it will remain set to AUTO until you change it.

STEP-ENTRY

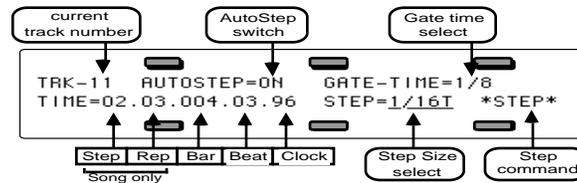
Range: OFF or ON

Determines whether Step Entry mode will be used when the sequencer is put into record.

- OFF — With this switch set to OFF, Step Entry Recording is disabled and the system will behave normally.

- ON — Whenever you go into Record with this switch set to ON, the TS-12 will automatically display the Step Entry page after the countoff has elapsed. If there is no countoff, then it will be immediately displayed.

The Step Entry page looks something like this (depending on the settings):



TRK

Range: 1 to 12 (read only)

The number of the currently selected track (on which you are recording) is shown in the upper left corner of the display. It is displayed only to remind you which track is being recorded and it cannot be selected or edited.

AUTOSTEP

Range: OFF or ON

This switch determines whether key events will advance to the next defined time setting.

- ON — each individual key *down* event will cause a note to be recorded on the track and will automatically advance the sequencer time by the amount set in the step size parameter. The duration of the note is controlled by the gate time select parameter.
- OFF — key events do *not* automatically advance the sequencer time, and multiple events can be recorded at the same track location (time).

If you use AUTOSTEP=ON for entering chords, the result will be an arpeggiated chord, similar to a guitar chord being strummed. This is true because each note of the chord will advance the time by the step size, causing older notes to have longer durations.

Tip: When AUTOSTEP=OFF, assigning a Foot Switch to STEP-REC (on the System page) allows you to advance the sequencer time by the amount set in the step size parameter, whenever you press the assigned foot switch. This makes it possible to record multiple events at the same track location (time) before advancing to the next sequence step.

GATE-TIME

Range: HELD, STEP, or 1/1 to 1/64T

The gate time (duration) value of a note is assigned when a key is released. This parameter allows you to determine how long the source will sound before it is gated (cut-off).

- HELD — the amount of time that you hold down the key(s) while advancing the track will determine the gate time. The time between key down and key release will be the duration.
- STEP — the duration of new notes will be the same as the current step size.
- 1/1 to 1/64T (and dotted note values 1/1D to 1/16D) — when you select any of these settings, the displayed note value will be used for the duration. If you need finer resolution, or wish to have longer gate times than a whole note (1/1), use the closest available value to enter the note and then, after you have finished with Step Recording, use the Event Editor to precisely adjust the duration.

TIME Range: (described below)

Allows you to set the current location on the track. The track location (or time) is normally displayed as a three-part parameter when you are recording a *sequence* track, with two additional parts added when a *song* track is being recorded. In sequence mode, the three parts are Bars, Beats, and Clocks. In song mode, Step Number and Repetition Count fields are added to the left of the Bars, Beats, and Clocks fields.

The maximum ranges for these fields are determined by the length of the track. In song mode, the song structure is also important because the number of steps, the number of repetitions of each step, and the sequence length of each step are factored into the computation of the song track length.

You can advance the track by changing any of the fields, and if you have selected RECORD-MODE=LOOPED on the Sequencer Control page, advancing past the end of the track will wrap around to the beginning. Otherwise, if you advance past the end of the track you will enter Audition mode.

STEP Range: (described below)

Allows you to set the current step size which will be added to the current track location (TIME) whenever you use the *STEP* command, or when AUTOSTEP=ON. The range of step sizes is from whole notes (1/1) to 1/64th note triplets (1/64T). Dotted note values are also available (1/1D to 1/16D).

Note Name	Setting	Beat.Clock
Whole note	1/1	4.00
Whole note triplet	1/1T	2.64
Half note	1/2	2.00
Half note triplet	1/2T	1.32
Quarter note	1/4	1.00
Quarter note triplet	1/4T	0.64
Eighth note	1/8	0.48
Eighth note triplet	1/8T	0.32
Sixteenth note	1/16	0.24
Sixteenth note triplet	1/16T	0.16

Note Name	Setting	Beat.Clock
32nd note	1/32	0.12
32nd note triplet	1/32T	0.08
64th note	1/64	0.06
64th note triplet	1/64T	0.04
Dotted whole note	1/1D	6.00
Dotted half note	1/2D	3.00
Dotted quarter note	1/4D	1.48
Dotted eighth note	1/8D	0.72
Dotted 16th note	1/16D	0.36

STEP

Pressing this soft button will advance the track location (TIME) by the amount set in the STEP parameter. Notice the TIME parameter adjusts to the new location on the track when the *STEP* button is pressed.

If you have selected RECORD-MODE=LOOPED on the Sequencer Control page, stepping past the end of the track will wrap around to the beginning, allowing you to continue stepping. Otherwise, if you step past the end of the track you will enter Audition mode.

If you are using a Foot Switch with the TS-12, you can assign the foot switch to advance the location by setting FS1=*STEP* on the System page. Pressing the foot switch will act just like the *STEP* command on the Step Entry page. This is useful when you need both hands to control the keyboard.

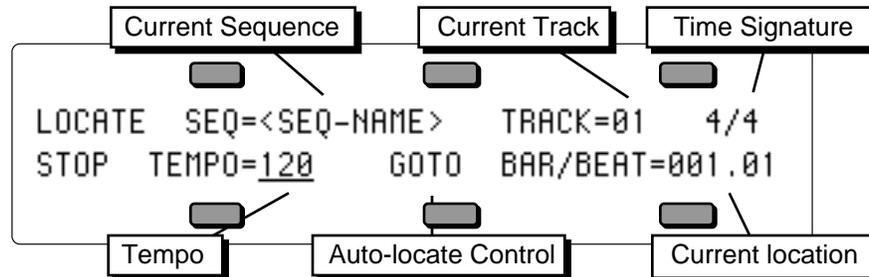
Locate Page

Pressing the Sequencer **Locate** button displays a page which provides valuable sequencer information as well as control over tempo and Auto-locate functions. Pressing **Locate** again will reveal the second sub-page where you can set the Edit Times for use with the Autopunch feature.

First we will look at the Locate page as it appears when a sequence is selected. When a song is selected, the Locate page is a little different (see below).

Sequence Locate Page

- Select a sequence from one of the Sequencer Bank pages.
- Press **Locate**. When a sequence is selected, the Locate page shows:



The status of the sequencer (whether it is in Play, Stop, Record, etc.) is always shown in the lower left-hand corner of the display on this page.

The following are *display only* parameters, provided here for your information:

SEQ

Shows the name of the current sequence.

TRACK

Shows the current primary/selected track. You cannot change the selected track from here; you do that from the Seq/Song Tracks 1-6 or 7-12 page.

Time Signature

Shows the time signature of the current sequence.

BAR/BEAT

Shows your current location in the sequence by bar and beat. You can locate to a different place in the sequence using the GOTO function described below.

The active controls on the Sequence Locate page are:

TEMPO (Tap Tempo)

Seq Range: 25 to 250 BPM, or EXT, Song Range: -64 to +63

Sets the tempo of the current sequence or song. On any of the three pages where tempo appears (Click, Sequencer Control, and Locate), the soft button nearest the TEMPO field can be used to “tap” in the tempo. If the field is already selected, tapping on the soft button at the correct rate for the desired tempo (based on the metronome settings on the click page) will update the tempo to the newest value. When CLOCK=MIDI on the Sequencer Control page, this field will read TEMPO=EXT to indicate that the tempo is controlled by incoming MIDI clocks.

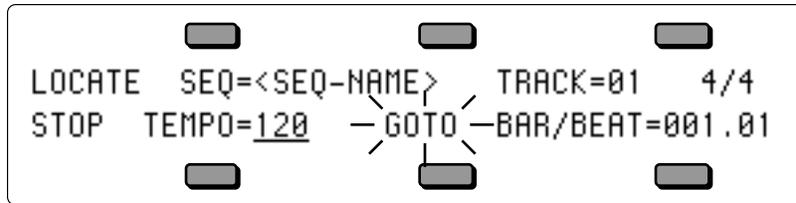
When a song is selected, the range is expressed as a percentage of the sequence tempo — changing the song tempo offset automatically adjusts the tempo of each the sequences in the song by a percent, within the legal limits of 25-250 BPM. When TEMPO=+00 the sequences in the song will play at their designated tempo.

When a Song Tempo Track is selected, editing this value will record tempo change events.

GOTO — Sequence Autolocate Control

Displays the GOTO sub-page where the auto-locator destination is set. Use the GOTO function to quickly locate to any bar and beat within the sequence, in order to play or record from there.

- Press GOTO. The display shows:



GOTO will be flashing and the destination may be set using the **Data Entry Slider** or the **Up/Down Arrow** buttons. Notice there is now a cursor (underline) beneath the bar value at the BAR/BEAT parameter. Press the soft button beneath BAR/BEAT to move the cursor between the Bar and Beat. Continued presses of the BAR/BEAT parameter will toggle between the bar and beat values.

- After selecting a new location to go to, press the GOTO soft button again to complete the locating process and return to the main Locate page. The GOTO function provides a quick and easy way to repeatedly locate to a certain place in a sequence — the destination remains set until a new sequence or song is selected.
- After using the GOTO function to locate to a spot in the sequence, press **Stop/Continue** to begin playing the sequence from that point.

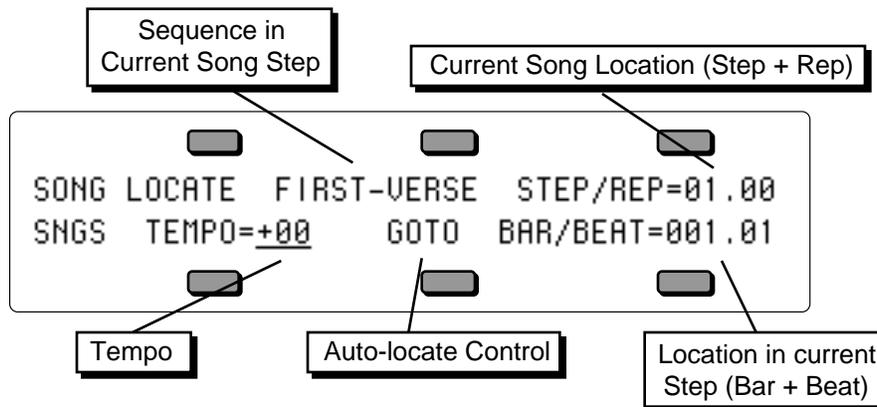
Setting the GOTO Locate Time While the Sequence Plays

You can set the location of the GOTO time “on the fly” as the sequence plays:

- Press **Play** to begin playing the sequence.
- When the sequence reaches the point where you want to set the GOTO location, press GOTO. The display momentarily shows LOCATE TIME SET - STOP TO LOCATE, and installs that time as the GOTO location.
- Press **Stop•Continue** (or let the sequence end).
- Now if you press GOTO twice, it will go to the same location that was set as when it was playing.

Song Locate Page

- Select a song from one of the Sequencer Bank pages.
- Press **Locate**. When a song is selected, the Locate page shows:



Note that the Sequencer Status (shown in the lower left corner of the display) now shows SNGS, for Song Stop, indicating that a song is selected.

The following are *display only* parameters, provided here for your information:

Sequence Name

Shows the name of the sequence which is playing as the current song step. This is updated with the new steps as the song plays.

STEP/REP

Shows your current location in the song by steps and repetitions. You can locate to a different place in the song using the GOTO function described below.

BAR/BEAT

Shows your location within the current song step by bar and beat. As with the song steps and reps, you can locate to a different point using the GOTO function.

The user-controllable parameters on the Song Locate page are:

TEMPO

Range: -99 to +99 BPM, or EXT

This controls the tempo of the song. It is expressed as a percentage of the sequence tempo — changing the song tempo offset automatically adjusts the tempo of each the sequences in the song by +/-99%, within the legal limits of 25-250 BPM. When TEMPO=+00 the sequences will play at their designated tempo.

When CLOCK=MIDI on the Sequencer Control page, this field will read TEMPO=EXT to indicate that the tempo is being controlled by incoming MIDI clocks.

GOTO — Song Autolocate control

The GOTO sub-page looks a little different in song mode, as you can locate to any step or rep in the song, as well as to any bar and beat within the step.

- Press GOTO. The display shows:



- GOTO is flashing and the destination may be set using the Data Entry Controls.
- Press the soft button above the Step/Rep field to move the cursor between the Step and Repetition selecting the desired destination. Press the soft button beneath the Bar/Beat field to move the cursor between the Bar and Beat.
- Press GOTO again to complete the locating process and return to the main Locate page with the new location currently viewed.
- After using the GOTO function to locate to a point in the song, press **Stop/Continue** to begin playing from that point.

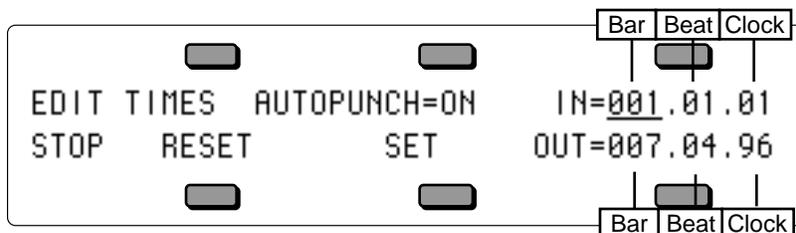
Setting the GOTO Locate Time While the Song Plays

You can set the location of the GOTO time “on the fly” as the song plays:

- Press **Play** to begin playing the song.
- When the song reaches the point where you want to set the GOTO location, press GOTO. The display momentarily shows LOCATE TIME SET - STOP TO LOCATE, and installs that time as the GOTO location.
- Press **Stop•Continue** (or let the song end).
- Now if you press GOTO twice, it will go to the same location that was set as when it was playing.

Edit Times — Using the Autopunch Feature

Press **Locate** a second time to display the Edit Times sub-page:



AUTOPUNCH

Range: ON or OFF

This is the same parameter found on the Sequencer Control page — it is also located on this page so that you have a handy way to enable or disable the Autopunch function on the same page where the Edit Times are located. See “Sequencer Control page” earlier in this section for a full description.

- ON — the TS-12 uses the Edit Times for entering and exiting record state.
- OFF — normal recording without using Edit Times.

When the Autopunch function is on, the TS-12 will enter and exit record only at the points specified by the Edit Times. For example, if you want to have the TS-12 automatically record over just the third bar of a four bar sequence:

- Set the Autopunch parameter to AUTOPUNCH=ON.
- Select the IN Edit Time and set to IN = 003.01.01 (bar 3, beat 1, clock 1)
- Select the OUT Edit Time and set to IN = 003.04.96 (bar 3, beat 4, clock 96)

Section 12 — Sequencing/MIDI Applications

This section covers a number of advanced sequencer applications, including using the TS-12 with a variety of external MIDI devices.

Using the TS-12 with a Drum Machine

When you use the TS-12 in conjunction with a drum machine or other rhythm sequencer, there are basically three ways to go:

- 1) Sync the drum machine's clock to the TS-12
- 2) Sync the TS-12's clock to the drum machine
- 3) Sequence the drum machine from the TS-12 (just as you would a synthesizer)

To Sync a Drum Machine to the TS-12:

- Connect the MIDI Out of the TS-12 to the MIDI In of the drum machine.
- Set the drum machine to sync to MIDI clocks.
- Set the drum machine to receive on an unused MIDI Channel, OMNI Off; or disable Channel information. You don't want the drum machine playing TS-12 sequence data intended for other instruments. MIDI Clocks, Start, Stop and Continue are real-time commands, and are sent and received regardless of MIDI channel or mode.
- The drum machine should now sync to the TS-12's clock. Pressing **Play** or **Stop/Continue** will Start, Stop and Continue the drum machine, assuming it receives those commands.

To Sync the TS-12 to a Drum Machine:

- Connect the MIDI Out of the drum machine to the MIDI In of the TS-12.
- Set the TS-12 to sync to MIDI clocks. On the Sequencer Control page, select CLOCK=MIDI.
- Set the drum machine to not send channel info, or to send on a MIDI Channel that is not being used by any of the TS-12 tracks. Again, MIDI Clocks, Start, Stop and Continue are sent and received regardless of MIDI channel or mode.
- The TS-12 should now sync to the drum machine's clock. Starting, Stopping or Continuing the drum machine will Start, Stop and Continue the TS-12.

To Sequence a Drum Machine from a Track of the TS-12:

- Connect the MIDI Out of the TS-12 to the MIDI In of the drum machine.
- Set the drum machine to Tape Sync or External Clock, or any setting other than Internal or MIDI Clock. This way it will not play it's own patterns, but will act only as a sound-producing device, sequenced from a track of the TS-12.
- Set the drum machine to POLY (OMNI Off) mode, and select a MIDI Channel.
- From the Track MIDI Page, assign a track on the TS-12 MIDI Status, and set it to the same MIDI Channel you assigned the drum machine.
- You should now be able to play the drum machine from the TS-12 keyboard. You can then record a track on the TS-12, from the TS-12 keyboard, which will play on the drum machine — just as if you were sequencing an external synthesizer. The advantage of this approach is that some drum machines respond better to velocity when played from MIDI than when played from their own front panels. Thus you may get more dynamic range out of your drum machine if you use this approach. The disadvantage is that you use up TS-12 sequencer memory to sequence the drum machine.

Song Position Pointers

The TS-12 transmits and receives Song Position Pointers via MIDI. Song Position Pointers are MIDI commands that tell a sequencer or drum machine where to locate within a song or sequence.

When the TS-12 receives a Song Position Pointer, it will locate to the appropriate place in the selected song or sequence.

The TS-12 sends a Song Position Pointer over MIDI whenever you use the Auto-Locate control (the GOTO function on the Locate Page). Any receiving unit which recognizes Song Position Pointers will locate to the same spot.

Not all remote MIDI devices recognize Song Position Pointers. Consult the manual of any other sequencing device you are using, to see if it does.

MIDI Song Selects

MIDI Song Selects allow a sequencer such as the TS-12 to instruct a remote MIDI sequencer or drum machine to select a new song whenever you select a Sequence or Song on the TS-12. Whether or not the TS-12 sends or receives Song Selects depends on the setting of the SONG-SEL parameter on the MIDI Control sub-page.

The TS-12 transmits and receives MIDI Song Selects in Sequence Mode as well as Song Mode (depending again on the setting on the SONG-SEL parameter). This allows you to select any TS-12 sequencer location from a remote sequencer, computer or drum machine, and vice versa. They are set up as follows:

- MIDI Song Selects # 00-59 will select TS-12 Sequencer locations # 00-59.
- Selecting Sequencer locations # 00-59 will cause the TS-12 to send MIDI Song Selects # 00-59

MIDI Controller Tricks — Creating MIDI Track Templates

There are some subtle features of the TS-12 sequencer which enhance its capabilities as a MIDI controller. You can change the sound and mix of every instrument in your rig with the push of a button, and create giant presets with as many as 12 remote MIDI devices split and/or layered. Each sequence you create and store in the TS-12's sequencer memory contains up to 12 sets of Sound and Mixing information, each of which will be sent out on the designated MIDI Channel when you select that sequence. Each sequence also remembers *all* Performance/Track Parameters settings for each track, as well as which tracks are selected or layered.

If you have the TS-12 connected to other instruments via MIDI, try this:

- Press **Seqs/Songs**, and select a -BLANK- location to create a new sequence. Name this sequence MIDI-OUT-1, or something similar, to indicate that it is specially set up as a MIDI controller template.
- Press the **Seq/Song Tracks 1-6** button, and select the first track.
- Press **Track MIDI**, and set the track's STATUS to SEND/RECV; on the second sub-page set the CHANNEL to the MIDI channel of one of your remote MIDI instruments; on the third sub-page, select a program for the instrument.
- Press **Seq/Song Tracks 1-6**, select another UNDEFINED track, and repeat the above steps, setting this track up to drive a different instrument. And so on, until you have one track playing each external instrument. Create a couple of MIDI-OFF tracks with different programs, too. Selecting one of them will let you play the TS-12 only. Selecting any of the MIDI tracks will let you play the receiving instrument that is set to the same MIDI channel as

that track.

- You see that from the Seq/Song Tracks 1-6 or 7-12 pages, you can change what plays from the TS-12 keyboard simply by selecting different tracks. You can layer tracks together by double-clicking their soft buttons. You can adjust the mix, key range, transpose, etc. for any of the tracks.
- Now create another sequence. (The TS-12 will ask you SAVE CHANGES TO <SEQ NAME>? Answer *YES*.) Name this sequence MIDI-OUT-2. For the tracks of the new sequence, go through the same procedure as before, but assigning different program numbers to the external instruments. (Remember always to change programs from the TS-12's Track MIDI sub-page.)
- Again, you can play a different external instrument, or the TS-12 alone, or the TS-12 and an external instrument, depending on which track(s) you select.

Now press **Seqs/Songs** and reselect the first sequence. (Again, the TS-12 will ask you SAVE CHANGES TO <SEQ NAME>? Answer *YES*.) Notice when you select the new sequence that all the external instruments connected to the TS-12 change to the proper program for that sequence — each track sent out a program change on its MIDI channel when the sequence was selected. Now select the second sequence again. Each external instrument again changes back to the proper program.

Notice that you haven't recorded anything on either of these sequences. They exist merely as *Track Templates*, which serve two useful purposes when using the TS-12 as a system controller:

- 1) Every time you select a new sequence, each track can send a program change to an external instrument. You can change the sound that every remote MIDI device in your rig is playing with one press of a button. Also the same tracks will be selected or layered as when you last saved the sequence.
- 2) When you select any track of a sequence, the TS-12 keyboard plays whatever program is on that track, or sends on the track's MIDI channel, or both. Select a different track and you have a different configuration. From the Seq/Song Tracks 1-6 and 7-12 pages you select any combination of local and/or MIDI sounds.

Of course you can record data on any of these sequences if you want. Whether you do or not, they will still work as templates. You can play external instruments from the TS-12 or from their own keyboards. You can have a track send a program change to a MIDI effects processor (like the ENSONIQ DP/4); have it send program changes to a sampler (like the ASR-10) to load sounds, or to a drum machine to change patterns, just by selecting a new sequence. No doubt you will come up with some applications of your own, based on your equipment and your needs.

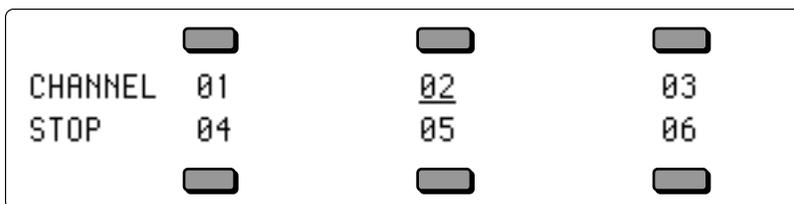
MULTI Mode — Receiving on up to 12 MIDI channels

When you select MODE=MULTI on the MIDI Control Page, the 12 tracks of the current sequence or song become like 12 "virtual instruments," each receiving independently on its own MIDI channel, but all sharing the same 32 voices and the same effects set-up.

- Press **MIDI Control**. Set MODE=MULTI. The 12 tracks of the current sequence will now each receive on its own MIDI channel, which you can select independently for each track.
- Create a new sequence. You might want to name this sequence *MULTI-IN, or something similar, to indicate that it is specially set up as a multi-channel MIDI receiver.
- Press **Seq/Song Tracks 1-6**. All the tracks except the first are still UNDEFINED. Select each of

the tracks, defining them and putting the current sound on them. Press 7-12 and do the same for the 6 tracks there. Then press **Seq/Song Tracks 1-6** again to return to the first 6 tracks.

- Press the **Track MIDI** button in the Track Parameters section. The first sub-page, labeled STAT, shows the status for the six tracks.
- Press **Track MIDI** again to reveal the second sub-page, labeled CHANNEL. Here you select the MIDI channels for the different tracks:



Select any track and set it to receive on the MIDI Channel you wish. Now, as long as the TS-12 is in MULTI Mode, incoming MIDI information on that channel will be received by that track. Incoming MIDI program changes will change the program on the track. Incoming MIDI volume messages will adjust the level of the track. Press **Seq/Song Tracks 7-12** and do the same for the 6 tracks there.

If (as is often the case) you don't want all 12 MIDI channels to receive:

- Press **Track MIDI** until you return to the Status sub-page and set the track(s) you want to disable to SEND/----. Any tracks set to SEND/---- will not respond to incoming MIDI (though they will send MIDI when played from the TS-12 keyboard).
- Press the **Seqs/Songs** button to go to the Sequencer Bank page, and select the same sequence again (press the soft button above or below the sequence location that's already underlined). The display will ask SAVE CHANGES TO <SEQ NAME>. Answer *YES*. This saves the track assignments you made. You might want to save this sequence to disk for future use.
- You don't need to record anything on this sequence — just leave it as a template for receiving on up to 12 different MIDI Channels. Whenever you want the TS-12 to act as a multi-channel MIDI receiver, just load or select this same template.

A Few Important Points About MULTI Mode

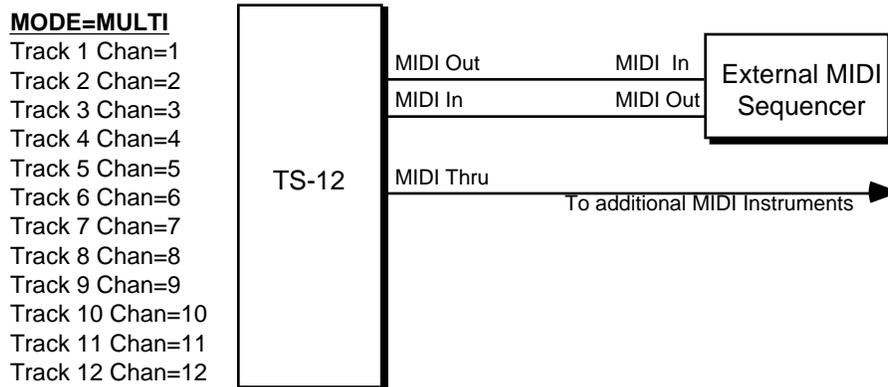
- When the TS-12 is in MULTI mode, *only* the 12 tracks of the MULTI mode will receive MIDI information. Sounds and presets selected in the normal fashion will not respond to MIDI at all.
- Each of the 12 sequencer tracks (six in **Seq/Song Tracks 1-6**, six in 7-12) is completely independent and polyphonic. The TS-12's *Dynamic Voice Allocation* means each track can have up to all 32 voices if it needs them. If all 32 voices are in use and a track needs a voice, it will "steal" the voice from the oldest note (or the one with the lowest voice priority).
- The 12 tracks respond independently to MIDI program changes, allowing you to assign a new sound to a track via MIDI. The selected sound's effect does not normally come with it — all of the 12 tracks in the sequence or song share the same effects setup, which can normally be changed only by editing the effect from within sequence.
- You can, however, cause a sound's effects set-up to become the sequence effect (which will then be applied to all 12 tracks) by sending a program change for the desired program number plus 60 (i.e. 60 to 119) (see "Receiving Program Changes" in Section 3 — MIDI Control Page Parameters).
- Only one track can receive on a given MIDI Channel. If two (or more) tracks are set to the same MIDI Channel, the lower-numbered track will receive on that channel and any higher-numbered track(s) set to the same channel will not receive at all.

- You may not want all 12 Tracks to receive. Tracks that you leave in the UNDEFINED state will not receive any MIDI data. Just define as many tracks as you need. Or set some tracks to SEND/---- on the Track MIDI page. Tracks set to SEND/---- will not respond to incoming MIDI data.

Using the TS-12 with an External MIDI Sequencer

For optimal results when using it with an external multi track sequencer, the TS-12 should be set up as described above to receive in Multi Mode, and the 12 tracks of the current sequence assigned to receive on the desired MIDI channels.

The illustration below shows a typical configuration for using the TS-12 with an external MIDI sequencer in MULTI Mode:



Each of the 12 tracks of the current sequence: keys, volume, controllers, and program changes, are controlled independently.

Note that the MIDI channel assignments shown above are merely default values. You can set any of the 12 tracks to receive on any of the 16 available MIDI channels (though, as mentioned above, only one track will receive on a given channel). Also, you can turn a track's Status to SEND/---- (so that it does not receive incoming MIDI at all) if you want less than 12 channels to be recognized by the TS-12.

When using the TS-12 as both the controller and one of several sound generators with an external sequencer:

- Set up the MIDI connections as shown in the diagram above.
- Set the external sequencer to echo incoming MIDI data at its output.
- Press **System** three times and set the MIDI-TRK-NAMES parameter to ON. When this parameter is ON, you will see the name of the sound on a track (instead of *MIDI-CHAN-##) when the track's status is MIDI.
- Press **Seq/Song Tracks 1-6** or **7-12** and set up your tracks for sequencing:
 - > For tracks that you want to play a TS-12 sound, set the Status to SEND/RECV. The track will send MIDI to the sequencer, and then will play local TS-12 voices when it receives the information back at its MIDI input.
 - > For tracks which you want to play one of the other MIDI devices, but *not* play a TS-12 sound, set the Status to LOCAL-OFF. The track will send MIDI to the sequencer, but will not play locally when the data is received. The MIDI Thru jack will send the information along to the remote MIDI devices.

Using The TS-12 with a MIDI Guitar Controller

The TS-12 makes an ideal voice module to use with any MIDI Guitar Controller which is capable of sending in MONO Mode. MONO Mode (MIDI Mode 4) allows a guitar controller to send the notes played on each string on a different MIDI Channel. This has the advantage of letting each string send pitch bends independently, which is the only way to truly recreate guitar technique on a synthesizer.

Some earlier guitar synths do not support MONO mode. You will have to consult the manual of your particular model to see if it does. If you have a guitar synth which only sends in POLY Mode (i.e. sends all six strings on the same MIDI Channel) you should use the TS-12 in POLY Mode (or OMNI Mode) and set the guitar controller to send on the MIDI Channel that is selected for the Base Channel on the MIDI Page.

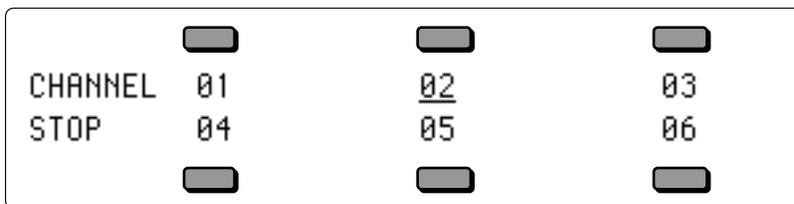
For MIDI Guitar Controllers which do support MONO Mode, the TS-12 provides two types of MONO mode reception. The first is MONO A Mode, which is a simple and straightforward way of using MONO mode without getting involved with tracks or other complications:

- Connect the MIDI Out of the guitar controller (or its MIDI converter) to the MIDI In of the TS-12.
- Set your guitar controller to send in MONO Mode on Channels 1-6. (Some models have an easy shortcut for getting into this state.)
- On the MIDI Control page, set the Base MIDI Channel to BASE-CHAN=01.
- Also on the MIDI Control page, set the MODE parameter to MODE=MONO A. This sets up the TS-12 to respond monophonically to 12 consecutive MIDI channels starting from the Base Channel (consult *Section 3 — MIDI Control Page Parameters* for a more complete description of MONO Mode).

You can now select sounds or presets on the TS-12, either from the front panel or from MIDI program changes, and the guitar controller will play those sounds exactly as if they were played from the keyboard.

If you are a little more adventurous, and would like the flexibility to put a different sound program on every string of the guitar, you can use MONO B mode, in which each track of the current sequence receives monophonically on its own MIDI channel, and can receive program changes independently. Where MONO A is like POLY mode with monophonic reception, MONO B is just like MULTI mode, except that each track is monophonic.

- Press **MIDI Control**. Set the MIDI In mode to MODE= MONO B. The 12 tracks of the current sequence will now each receive monophonically on its own MIDI channel
- Create a new sequence. You might want to name it "MONO-B IN", or something similar, to indicate that it is specially set up for this type of reception.
- Press **Seq/Song Tracks 1-6**. All the tracks except the first are still UNDEFINED. Select each of the six tracks, defining them and putting the current program on them. You can leave Seq/Song Tracks 7-12 undefined.
- Press **Track MIDI** twice to go to the MIDI CHANNEL sub-page. Here you select the MIDI channels for the different tracks:



The default values are as shown above. If you want to receive on a different set of MIDI channels, select each track and edit it accordingly. Unlike MONO A, in this mode the consecutive channel assignments are not automatic. You must set the tracks to six consecutive channels.

Now you're ready to play. A few things to bear in mind:

- Notes played on each string will play only the corresponding track. Each string/track combination is totally independent.
- You can change the program for each track manually from the TS-12's front panel (using the Replace Track Sound function) or by sending Program Changes from the controller via MIDI.
- Each track will accept Program Changes independently. In many cases you will want to have the guitar controller send the same-numbered Program Change on all six channels so that all six strings play the same sound. You can, however, send the TS-12 a different Program Change for each track. You could use this effect to have, for example, a bass sound play on the bottom two strings and a piano sound on the top four. Or if you are feeling experimental, you could play a different sound on each string.
- It's a good idea to set up and save to disk a special template sequence, as described above, which you always use in conjunction with the guitar synth. That way you won't accidentally change the programs in the tracks of an existing sequence.
- If your guitar synth can send certain MIDI controllers on their own MIDI Channels, have it send any controllers you want to affect all the tracks (such as the "whammy bar") on the Base-Channel-minus-1. When the Base Channel is 1, Global controllers should be sent on Channel 16.

Delay Times/Tempo BPM Chart

This chart shows the relationship between delay times and tempo beats per minute. Values shown are accurate to 2 decimal places—since most delay devices are not accurate to 2 decimal places, you may have to round off these values. You can use this chart to set the effect delay times to sync to your sequence or song.

BPM	1/4 NOTE	1/8th NOTE	1/8 TRIPLET	1/16th NOTE
40	1500.00	750.00	500.00	375.00
41	1463.41	731.71	487.80	365.85
42	1428.57	714.29	476.19	357.14
43	1395.35	697.67	465.12	348.84
44	1363.64	681.82	454.55	340.91
45	1333.33	666.67	444.44	333.33
46	1304.35	652.17	434.78	326.09
47	1276.60	638.30	425.53	319.15
48	1250.00	625.00	416.67	312.50
49	1224.49	612.24	408.16	306.12
50	1200.00	600.00	400.00	300.00
51	1176.47	588.24	392.16	294.12
52	1153.85	576.92	384.62	288.46
53	1132.08	566.04	377.36	283.02
54	1111.11	555.56	370.37	277.78
55	1090.91	545.45	363.64	272.73
56	1071.43	535.71	357.14	267.86
57	1052.63	526.32	350.88	263.16
58	1034.48	517.24	344.83	258.62
59	1016.95	508.47	338.98	254.24
60	1000.00	500.00	333.33	250.00

61	983.61	491.80	327.87	245.90
62	967.74	483.87	322.58	241.94
63	952.38	476.19	317.46	238.10
64	937.50	468.75	312.50	234.38
65	923.08	461.54	307.69	230.77
66	909.09	454.55	303.03	227.27
67	895.52	447.76	298.51	223.88
68	882.35	441.18	294.12	220.59
69	869.57	434.78	289.86	217.39
70	857.14	428.57	285.71	214.29
71	845.07	422.54	281.69	211.27
72	833.33	416.67	277.78	208.33
73	821.92	410.96	273.97	205.48
74	810.81	405.41	270.27	202.70
75	800.00	400.00	266.67	200.00
76	789.47	394.74	263.16	197.37
77	779.22	389.61	259.74	194.81
78	769.23	384.62	256.41	192.31
79	759.49	379.75	253.16	189.87
80	750.00	375.00	250.00	187.50
81	740.74	370.37	246.91	185.19
82	731.71	365.85	243.90	182.93

83	722.89	361.45	240.96	180.72
84	714.29	357.14	238.10	178.57
85	705.88	352.94	235.29	176.47
BPM	1/4 NOTE	1/8th NOTE	1/8 TRIPLET	1/16th NOTE
86	697.67	348.84	232.56	174.42
87	689.66	344.83	229.89	172.41
88	681.82	340.91	227.27	170.45
89	674.16	337.08	224.72	168.54
90	666.67	333.33	222.22	166.67
91	659.34	329.67	219.78	164.84
92	652.17	326.09	217.39	163.04
93	645.16	322.58	215.05	161.29
94	638.30	319.15	212.77	159.57
95	631.58	315.79	210.53	157.89
96	625.00	312.50	208.33	156.25
97	618.56	309.28	206.19	154.64
98	612.24	306.12	204.08	153.06
99	606.06	303.03	202.02	151.52
100	600.00	300.00	200.00	150.00
101	594.06	297.03	198.02	148.51
102	588.24	294.12	196.08	147.06
103	582.52	291.26	194.17	145.63
104	576.92	288.46	192.31	144.23
105	571.43	285.71	190.48	142.86
106	566.04	283.02	188.68	141.51
107	560.75	280.37	186.92	140.19
108	555.56	277.78	185.19	138.89
109	550.46	275.23	183.49	137.61
110	545.45	272.73	181.82	136.36
111	540.54	270.27	180.18	135.14
112	535.71	267.86	178.57	133.93
113	530.97	265.49	176.99	132.74
114	526.32	263.16	175.44	131.58
115	521.74	260.87	173.91	130.43
116	517.24	258.62	172.41	129.31
117	512.82	256.41	170.94	128.21
118	508.47	254.24	169.49	127.12
119	504.20	252.10	168.07	126.05
120	500.00	250.00	166.67	125.00
121	495.87	247.93	165.29	123.97
122	491.80	245.90	163.93	122.95
123	487.80	243.90	162.60	121.95
124	483.87	241.94	161.29	120.97
125	480.00	240.00	160.00	120.00
126	476.19	238.10	158.73	119.05
127	472.44	236.22	157.48	118.11
128	468.75	234.38	156.25	117.19
129	465.12	232.56	155.04	116.28
130	461.54	230.77	153.85	115.38
131	458.02	229.01	152.67	114.50
BPM	1/4 NOTE	1/8th NOTE	1/8 TRIPLET	1/16th NOTE
132	454.55	227.27	151.52	113.64
133	451.13	225.56	150.38	112.78
134	447.76	223.88	149.25	111.94
135	444.44	222.22	148.15	111.11
136	441.18	220.59	147.06	110.29
137	437.96	218.98	145.99	109.49
138	434.78	217.39	144.93	108.70
139	431.65	215.83	143.88	107.91
140	428.57	214.29	142.86	107.14
141	425.53	212.77	141.84	106.38
142	422.54	211.27	140.85	105.63
143	419.58	209.79	139.86	104.90
144	416.67	208.33	138.89	104.17
145	413.79	206.90	137.93	103.45
146	410.96	205.48	136.99	102.74
147	408.16	204.08	136.05	102.04
148	405.41	202.70	135.14	101.35
149	402.68	201.34	134.23	100.67
150	400.00	200.00	133.33	100.00
151	397.35	198.68	132.45	99.34
152	394.74	197.37	131.58	98.68
153	392.16	196.08	130.72	98.04
154	389.61	194.81	129.87	97.40
155	387.10	193.55	129.03	96.77
156	384.62	192.31	128.21	96.15
157	382.17	191.08	127.39	95.54
158	379.75	189.87	126.58	94.94
159	377.36	188.68	125.79	94.34
160	375.00	187.50	125.00	93.75
161	372.67	186.34	124.22	93.17

162	370.37	185.19	123.46	92.59
163	368.10	184.05	122.70	92.02
164	365.85	182.93	121.95	91.46
165	363.64	181.82	121.21	90.91
166	361.45	180.72	120.48	90.36
167	359.28	179.64	119.76	89.82
168	357.14	178.57	119.05	89.29
169	355.03	177.51	118.34	88.76
170	352.94	176.47	117.65	88.24
171	350.88	175.44	116.96	87.72
172	348.84	174.42	116.28	87.21
173	346.82	173.41	115.61	86.71
174	344.83	172.41	114.94	86.21
175	342.86	171.43	114.29	85.71
176	340.91	170.45	113.64	85.23
177	338.98	169.49	112.99	84.75
178	337.08	168.54	112.36	84.27
179	335.20	167.60	111.73	83.80
180	333.33	166.67	111.11	83.33
181	331.49	165.75	110.50	82.87
182	329.67	164.84	109.89	82.42
183	327.87	163.93	109.29	81.97
184	326.09	163.04	108.70	81.52
185	324.32	162.16	108.11	81.08
186	322.58	161.29	107.53	80.65
187	320.86	160.43	106.95	80.21
188	319.15	159.57	106.38	79.79
189	317.46	158.73	105.82	79.37
190	315.79	157.89	105.26	78.95
191	314.14	157.07	104.71	78.53
BPM	1/4 NOTE	1/8th NOTE	1/8 TRIPLET	1/16th NOTE
192	312.50	156.25	104.17	78.13
193	310.88	155.44	103.63	77.72
194	309.28	154.64	103.09	77.32
195	307.69	153.85	102.56	76.92
196	306.12	153.06	102.04	76.53
197	304.57	152.28	101.52	76.14
198	303.03	151.52	101.01	75.76
199	301.51	150.75	100.50	75.38
200	300.00	150.00	100.00	75.00
201	298.51	149.25	99.50	74.63
202	297.03	148.51	99.01	74.26
203	295.57	147.78	98.52	73.89
204	294.12	147.06	98.04	73.53
205	292.68	146.34	97.56	73.17
206	291.26	145.63	97.09	72.82
207	289.86	144.93	96.62	72.46
208	288.46	144.23	96.15	72.12
209	287.08	143.54	95.69	71.77
210	285.71	142.86	95.24	71.43
211	284.36	142.18	94.79	71.09
212	283.02	141.51	94.34	70.75
213	281.69	140.85	93.90	70.42
214	280.37	140.19	93.46	70.09
215	279.07	139.53	93.02	69.77
216	277.78	138.89	92.59	69.44
217	276.50	138.25	92.17	69.12
218	275.23	137.61	91.74	68.81
219	273.97	136.99	91.32	68.49
220	272.73	136.36	90.91	68.18
221	271.49	135.75	90.50	67.87
222	270.27	135.14	90.09	67.57
223	269.06	134.53	89.69	67.26
224	267.86	133.93	89.29	66.96
225	266.67	133.33	88.89	66.67
226	265.49	132.74	88.50	66.37
227	264.32	132.16	88.11	66.08
228	263.16	131.58	87.72	65.79
229	262.01	131.00	87.34	65.50
230	260.87	130.43	86.96	65.22
231	259.74	129.87	86.58	64.94
232	258.62	129.31	86.21	64.66
233	257.51	128.76	85.84	64.38
234	256.41	128.21	85.47	64.10
235	255.32	127.66	85.11	63.83
236	254.24	127.12	84.75	63.56
237	253.16	126.58	84.39	63.29
238	252.10	126.05	84.03	63.03
239	251.05	125.52	83.68	62.76
240	250.00	125.00	83.33	62.50
241	248.96	124.48	82.99	62.24

242	247.93	123.97	82.64	61.98
243	246.91	123.46	82.30	61.73
244	245.90	122.95	81.97	61.48
245	244.90	122.45	81.63	61.22
246	243.90	121.95	81.30	60.98

247	242.91	121.46	80.97	60.73
248	241.94	120.97	80.65	60.48
249	240.96	120.48	80.32	60.24
250	240.00	120.00	80.00	60.00

Tip: Assign a controller to modulate the effect delay times, and select a specified minimum and maximum range so that you can create unique poly-rhythms in real-time.

What is General MIDI?

General MIDI (GM) is an industry standard for program mapping that defines 128 sounds and their locations. This means that if a device conforms to the GM standard, MIDI Program Change #1 will always call up an acoustic piano. MIDI Program Change #62 will always call up a brass section, etc. Although the actual sounds (tone and quality) will vary from product to product, each specific MIDI Program number will always call up the same *type* of sound.



Sound Map

The General MIDI Sound Map (found later in this section) lists the 128 General MIDI sounds in the TS-12 ROM and their assigned General MIDI Program Change numbers.

Percussion

General MIDI also includes a Percussion Key Map, defining specific drum voices for each key. To avoid confusion, General MIDI *always* assigns percussion to MIDI channel 10. The General MIDI Percussion Key Map can be found after the General MIDI Sound Map.

GS/MT-32 Compatibility

GS is an extended MIDI sound specification originated by Roland® Corp. Although we provide the GS Drum Maps (listed later) and MT-32 Program Change Map for Roland Sound Canvas™ compatibility, the TS-12 is not GS compatible and does not contain the GS Alternate Sound Banks.

Other General MIDI Requirements

A General MIDI sound module must respond to all 16 MIDI channels, with dynamic voice allocation, and a minimum of 24 voices. It also must respond to velocity, pitch bend, mod wheel, volume and pan, expression, sustain, and the All Notes Off and Reset All Controllers messages. With these controllers supported, a composition that relies on note articulations and mix settings can be played back and still sound correct when played by any GM sound module. The TS-12 supports all of the above MIDI messages, and fully conforms to the General MIDI Specification.

Why use General MIDI?

While the TS-12 instruments are a superb sound source, with greater fidelity and more programmability than most GM modules, there are interesting applications for General MIDI that can enhance your music making.

1. There is an interesting genre of music software (for your computer) that creates backing patterns for you to play along with, for pleasure and study. These programs include:

Band in a Box For more information contact:
PG Music Inc.
266 Elmwood Avenue
Suite 111
Buffalo, NY 14222
Voice 1-800-268-6272 or 905-528-2368
FAX 905-628-2541

Jammer For more information contact:
Soundtrek
3384 Hill Dr.
Duluth, GA 30136
Voice 404-623-0879
FAX 404-623-3054

MiBac Jazz For more information contact:
MiBac Music Software
PO Box 468
Northfield, MN 55057
Voice 507-645-5851

2. Many pre-recorded pieces of music can be purchased for home listening, solo performance backing tracks (e.g., instant karaoke), and other applications. Note that this application requires a computer/hardware sequencer/sequencer player and some type of computer software (such as those listed above). Look through current issues of music/computer software magazines for listings (these products must conform to the Standard MIDI File [SMF] format* in order to use them properly).

* A Standard MIDI File (SMF) is a MIDI protocol designed for sharing sequences between different products.

3. There is an ever-increasing amount of educational software that uses General MIDI for such applications as ear training, music lessons, etc.
4. Some computer games offer General MIDI as an optional sound source. The TS-12 will provide high quality sound variations for this enjoyable leisure activity, enhancing the excitement and thrill of your computer games.

General MIDI Sound Map

The following map shows the General MIDI sound name and program change number of each sound as they appear in the TS-12. This map also shows how General MIDI divides the instruments into 16 categories of similar sounds:

PROG #	INSTRUMENT	PROG #	INSTRUMENT	PROG #	INSTRUMENT	PROG #	INSTRUMENT
1-8	PIANO	33-40	BASS	65-72	REED	97-104	SYNTH EFFECTS
1	GRAND-PIANO	33	ACOUSTIC-BS	65	SOPRANO-SAX	97	ICE-RAIN
2	BRITE-PIANO	34	FINGERED-BS	66	ALTO-SAX	98	SOUNDTRACK
3	ELEC-GRAND	35	PICKED-BASS	67	TENOR-SAX	99	CRYSTAL
4	HONKY-TONK	36	FRETLESS-BS	68	BARI-SAX	100	ATMOSPHERE
5	ELEC-PIANO1	37	SLAP-BASS-1	69	OBOE	101	BRIGHTNESS
6	ELEC-PIANO2	38	SLAP-BASS-2	70	ENGLISH-HRN	102	GOBLINS
7	HARPSICHORD	39	SYNTH-BASS1	71	BASSOON	103	ECHO-DROPS
8	CLAVINET	40	SYNTH-BASS2	72	CLARINET	104	STAR-THEME
9-16	CHROM PERCUSSION	41-48	STRINGS	73-80	PIPE	105-112	ETHNIC
9	CELESTA	41	VIOLIN	73	PICCOLO	105	SITAR
10	GLOCKNSPIEL	42	VIOLA	74	FLUTE	106	BANJO
11	MUSIC-BOX	43	CELLO	75	RECORDER	107	SHAMISEN
12	VIBRAPHONE	44	CONTRABASS	76	PANFLUTE	108	KOTO
13	MARIMBA	45	TREMOLO-STR	77	BOTTLE-BLOW	109	KALIMBA
14	XYLOPHONE	46	PIZZI-STRGS	78	SHAKUHACHI	110	BAGPIPES
15	TUBULR-BELLS	47	HARP	79	WHISTLE	111	FIDDLE
16	DULCIMER	48	TYMPANI	80	OCARINA	112	SHANNAI
17-24	ORGAN	49-56	ENSEMBLE	81-88	SYNTH LEAD	113-120	PERCUSSIVE
17	DRWBAR-ORGN	49	STRG-ENSMBL	81	SQUARE-WAVE	113	TINKLE-BELL
18	PERC-ORGAN	50	SLOW-STRNGS	82	SAW-WAVE	114	AGOGO
19	ROCK-ORGAN	51	SYNTH-STR-1	83	CALLIOPE	115	STEEL-DRUMS
20	CHRCH-ORGAN	52	SYNTH-STR-2	84	CHIFF-LEAD	116	WOODBLOCK
21	REED-ORGAN	53	CHOIR-AAHS	85	CHARANG	117	TAIKO-DRUM
22	ACCORDION	54	VOICE-OOHS	86	SOLO-VOICE	118	MELODIC-TOM
23	HARMONICA	55	SYNTH-VOICE	87	SAW-FIFTHS	119	SYNTH-DRUM
24	BANDONEON	56	ORCH-HIT	88	BASS+LEAD	120	REVERSE-CYM
25-32	GUITAR	57-64	BRASS	89-96	SYNTH PAD	121-128	SOUND EFFECTS
25	NYL-STR-GTR	57	TRUMPET	89	NEW-AGE-PAD	121	GT-FRETNIS
26	STL-STR-GTR	58	TROMBONE	90	WARM-PAD	122	BREATHNOISE
27	JAZZ-GUITAR	59	TUBA	91	POLYSYNTH	123	SEASHORE
28	CLEAN-GUITR	60	MUTED-TRMPT	92	SPACE-VOICE	124	BIRD-TWEET
29	MUTED-GUITR	61	FRENCH-HORN	93	GLASS	125	TELEPHONE
30	OVRDRIV-GTR	62	HORN	94	METALIC-PAD	126	HELICOPTER
31	DISTORT-GTR	63	BRASS-SECTN	95	HALO-PAD	127	APPLAUSE
32	GTR-HRMONIC	64	SYN-BRASS-1	96	SWEEP-PAD	128	GUN-SHOT
			SYN-BRASS-2				

Note that the names listed above are as they appear in the TS-12, and not as they appear in the General MIDI Spec. The only differences are in spelling.

GM and GS Percussion Key Maps (Channel 10)

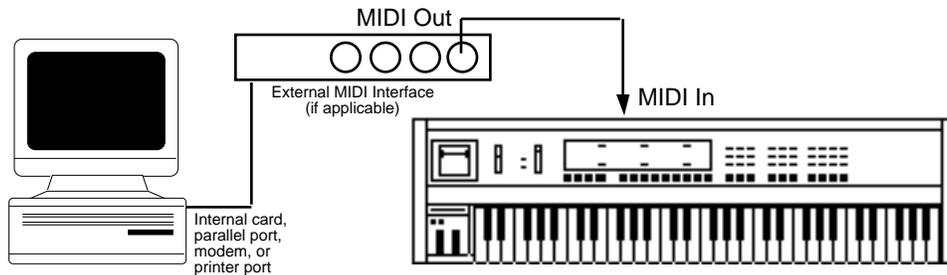
MIDI Note #		1 - STANDARD-KIT 33 - JAZZ-KIT	9 - ROOM-KIT	17 - POWER-KIT	25 - ELCTRNC-KIT
35	B1	Kick Drum 2	Kick Drum 2	Kick Drum	Kick Drum
36	C2	Kick Drum 1	Kick Drum 1	Mondo Kick	Elec Bass Drum
37	C2+	Side Stick	Side Stick	Side Stick	Side Stick
38	D2	Acoustic Snare	Acoustic Snare	Gated Snare	Electric Snare
39	D2+	Hand Clap	Hand Clap	Hand Clap	Hand Clap
40	E2	Electric Snare	Electric Snare	Electric Snare	Gated Snare
41	F2	Low Floor Tom	Low Room Tom	Low Room Tom	Elec Low Tom
42	F2+	Closed Hi-Hat	Closed Hi-Hat	Closed Hi-Hat	Closed Hi-Hat
43	G2	High Floor Tom	Low Room Tom 2	Low Room Tom 2	Elec Low Tom
44	G2+	Pedal Hi-Hat	Pedal Hi-Hat	Pedal Hi-Hat	Pedal Hi-Hat
45	A2	Low Tom	Mid Room Tom	Mid Room Tom	Elec Mid Tom
46	A2+	Open Hi-Hat	Open Hi-Hat	Open Hi-Hat	Open Hi-Hat
47	B2	Low-Mid Tom	Mid Room Tom	Mid Room Tom	Elec Mid Tom
48	C3	High-Mid Tom	High Room Tom	High Room Tom	Elec High Tom
49	C3+	Crash Cymbal 1	Crash Cymbal 1	Crash Cymbal 1	Crash Cymbal 1
50	D3	High Tom	High Room Tom	High Room Tom	Elec High Tom
51	D3+	Ride Cymbal 1	Ride Cymbal 1	Ride Cymbal 1	Ride Cymbal 1
52	E3	Chinese Cymbal	Chinese Cymbal	Chinese Cymbal	Reverse Cymbal
53	F3	Ride Bell	Ride Bell	Ride Bell	Ride Bell
54	F3+	Tambourine	Tambourine	Tambourine	Tambourine
55	G3	Splash Cymbal	Splash Cymbal	Splash Cymbal	Splash Cymbal
56	G3+	Cowbell	Cowbell	Cowbell	Cowbell
57	A3	Crash Cymbal 2	Crash Cymbal 2	Crash Cymbal 2	Crash Cymbal 2
58	A3+	Vibraslap	Vibraslap	Vibraslap	Vibraslap
59	B3	Ride Cymbal 2	Ride Cymbal 2	Ride Cymbal 2	Ride Cymbal 2
60	C4	High Bongo	High Bongo	High Bongo	High Bongo
61	C4+	Low Bongo	Low Bongo	Low Bongo	Low Bongo
62	D4	Mute High Conga	Mute High Conga	Mute High Conga	Mute High Conga
63	D4+	Open High Conga	Open High Conga	Open High Conga	Open High Conga
64	E4	Low Conga	Low Conga	Low Conga	Low Conga
65	F4	High Timbale	High Timbale	High Timbale	High Timbale
66	F4+	Low Timbale	Low Timbale	Low Timbale	Low Timbale
67	G4	High Agogo	High Agogo	High Agogo	High Agogo
68	G4+	Low Agogo	Low Agogo	Low Agogo	Low Agogo
69	A4	Cabasa	Cabasa	Cabasa	Cabasa
70	A4+	Maracas	Maracas	Maracas	Maracas
71	B4	Short Whistle	Short Whistle	Short Whistle	Short Whistle
72	C5	Long Whistle	Long Whistle	Long Whistle	Long Whistle
73	C5+	Short Guiro	Short Guiro	Short Guiro	Short Guiro
74	D5	Long Guiro	Long Guiro	Long Guiro	Long Guiro
75	D5+	Claves	Claves	Claves	Claves
76	E5	High Wood Block	High Wood Block	High Wood Block	High Wood Block
77	F5	Low Wood Block	Low Wood Block	Low Wood Block	Low Wood Block
78	F5+	Mute Cuica	Mute Cuica	Mute Cuica	Mute Cuica
79	G5	Open Cuica	Open Cuica	Open Cuica	Open Cuica
80	G5+	Mute Triangle	Mute Triangle	Mute Triangle	Mute Triangle
81	A5	Open Triangle	Open Triangle	Open Triangle	Open Triangle
82	A5+	Shaker	Shaker	Shaker	Shaker
83	B5	Jingle Bell	Jingle Bell	Jingle Bell	Jingle Bell
84	C6	Belltrees	Belltrees	Belltrees	Belltrees
85	C6+	Castanets	Castanets	Castanets	Castanets
86	D6	Mute Surdo	Mute Surdo	Mute Surdo	Mute Surdo
87	D6+	Open Surdo	Open Surdo	Open Surdo	Open Surdo
88	E6				

GM and GS Percussion Key Maps (Channel 10)

MIDI Note #		26 - TR-808-KIT	41 - BRUSH-KIT	49 - ORCH-PERCSN	128 - MT-32-KIT
35	B1	Kick Drum 2	Kick Drum 2	Concert Bass Drum	Acoustic Bass Drum
36	C2	808 Bass Drum	Kick Drum 1	Concert Bass Drum	Bass Drum 1
37	C2+	808 Rim Shot	Side Stick	Side Stick	Rim Shot
38	D2	808 Snare Drum	Brush Tap	Concert Snare Drum	Acoustic Snare
39	D2+	Hand Clap	Brush Slap	Castanets	Hand Clap
40	E2	Electric Snare	Brush Swirl	Concert Snare Drum	Electric Snare
41	F2	808 Low Tom	Low Floor Tom	Tympani F	Acoustic Low Tom
42	F2+	808 Closed Hi-Hat	Closed Hi-Hat	Tympani F#	Closed Hi-Hat
43	G2	808 Low Tom	High Floor Tom	Tympani G	Acoustic Low Tom
44	G2+	808 Closed Hi-Hat	Pedal Hi-Hat	Tympani G#	Open Hi-Hat
45	A2	808 Mid Tom	Low Tom	Tympani A	Acoustic Mid Tom
46	A2+	80 Open Hi-Hat	Open Hi-Hat	Tympani A#	Open Hi-Hat
47	B2	808 Mid Tom	Mid Tom	Tympani B	Acoustic Mid Tom
48	C3	808 High Tom	High Tom	Tympani C	Acoustic High Tom
49	C3+	808 Cymbal	Crash Cymbal 1	Tympani C#	Crash Cymbal
50	D3	808 High Tom	High Tom	Tympani D	Acoustic High Tom
51	D3+	Ride Cymbal 1	Ride Cymbal 1	Tympani D#	Ride Cymbal 1
52	E3	Chinese Cymbal	Chinese Cymbal	Tympani E	
53	F3	Ride Bell	Ride Bell	Tympani F	
54	F3+	Tambourine	Tambourine	Tambourine	Tambourine
55	G3	Splash Cymbal	Splash Cymbal	Splash Cymbal	
56	G3+	808 Cowbell	Cowbell	Cowbell	Cowbell
57	A3	Crash Cymbal 2	Crash Cymbal 2	Concert Cymbal 2	
58	A3+	Vibraslap	Vibraslap	Vibraslap	
59	B3	Ride Cymbal 2	Ride Cymbal 2	Concert Cymbal 1	
60	C4	High Bongo	High Bongo	High Bongo	High Bongo
61	C4+	Low Bongo	Low Bongo	Low Bongo	Low Bongo
62	D4	808 High Conga	Mute High Conga	Mute High Conga	Mute High Conga
63	D4+	808 Mid Conga	Open High Conga	Open High Conga	High Conga
64	E4	808 Low Conga	Low Conga	Low Conga	Low Conga
65	F4	High Timbale	High Timbale	High Timbale	High Timbale
66	F4+	Low Timbale	Low Timbale	Low Timbale	Low Timbale
67	G4	High Agogo	High Agogo	High Agogo	High Agogo
68	G4+	Low Agogo	Low Agogo	Low Agogo	Low Agogo
69	A4	Cabasa	Cabasa	Cabasa	Cabasa
70	A4+	808 Maracas	Maracas	Maracas	Maracas
71	B4	Short Whistle	Short Whistle	Short Whistle	Short Whistle
72	C5	Long Whistle	Long Whistle	Long Whistle	Long Whistle
73	C5+	Short Guiro	Short Guiro	Short Guiro	Quijada
74	D5	Long Guiro	Long Guiro	Long Guiro	
75	D5+	808 Claves	Claves	Claves	Claves
76	E5	High Wood Block	High Wood Block	High Wood Block	
77	F5	Low Wood Block	Low Wood Block	Low Wood Block	
78	F5+	Mute Cuica	Mute Cuica	Mute Cuica	Punch
79	G5	Open Cuica	Open Cuica	Open Cuica	Heartbeat
80	G5+	Mute Triangle	Mute Triangle	Mute Triangle	Footsteps 1
81	A5	Open Triangle	Open Triangle	Open Triangle	Footsteps 2
82	A5+	Shaker	Shaker	Shaker	Applause
83	B5	Jingle Bell	Jingle Bell	Jingle Bell	Creaking
84	C6	Belltire	Belltire	Belltire	Door
85	C6+	Castanets	Castanets	Castanets	Scratch
86	D6	Mute Surdo	Mute Surdo	Mute Surdo	Wind Chime
87	D6+	Open Surdo	Open Surdo	Open Surdo	
88	E6			Applause	

- There are four additional sounds assigned to keys in the MT-32-KIT:
90 (F6+) Crash 92 (G6+) Train 93 (A6) Jet 94 (A6+) Helicopter

Using General MIDI in the Real World



Computer (with MIDI Interface) connected to TS Keyboard

Using TS-12 General MIDI Sounds with an External GM Sequencer

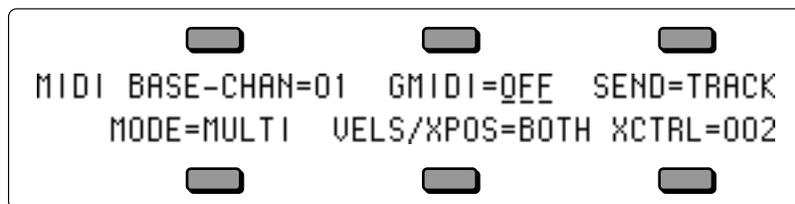
Connecting the TS-12 keyboard to a computer (or other General MIDI sequencer)

1. Power down all electronic devices before making any connections.
 2. Using a MIDI Cable, connect the **MIDI In** jack of the TS-12 to the MIDI Out jack of the computer/hardware sequencer/sequence player.
- Note:** Many computers do not have a MIDI jack built into them, and require an additional MIDI Interface connector between the computer and the TS-12.
3. Make sure the proper amplification is connected to the TS-12, and power on the computer, the TS-12 keyboard, and the amplification system (in that order).

Tip: Headphones connected to the **Phones** jack of the TS-12 will work fine in General MIDI mode, and allow you to work late hours without disturbing others.

To Enable General MIDI on the TS-12

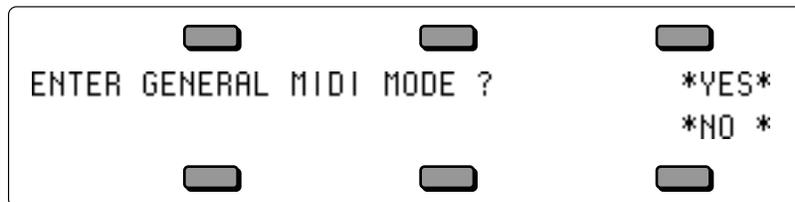
1. Press the **MIDI Control** button. The display shows:



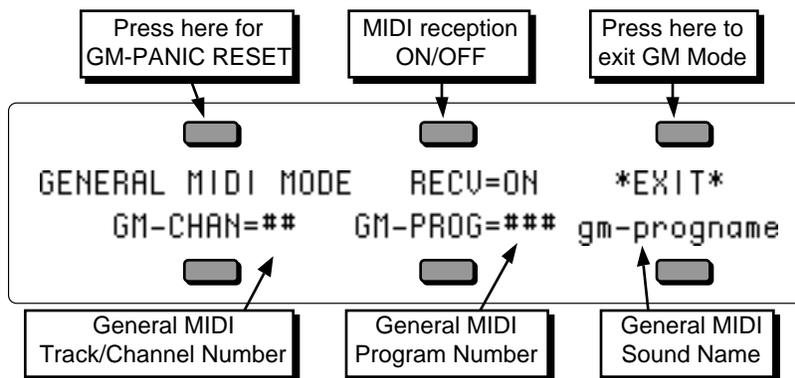
2. On the first **MIDI Control** sub-page, press the upper middle soft button on the display to select the GMIDI parameter (it should be underlined).

3. Press the **Up Arrow** button to enter General MIDI mode.

If the sequencer is running, the SEQUENCER MUST BE STOPPED message will be displayed. If the sequencer is stopped, the "SAVE CHANGES?" prompt will be displayed (if necessary). Otherwise, the following prompt will be displayed:



4. Pressing the soft button beneath ***NO*** will leave the TS-12 system unchanged, returning you to the first **MIDI Control** sub-page.
5. Pressing the soft button above ***YES*** will enable General MIDI Mode. All LEDs will be off and all buttons (except the **Arrow** buttons and the soft buttons) will be disabled. The TS-12 will display the General MIDI Mode page as follows:



The TS-12 behaves as though an enlarged 16-track sequence has been selected, and as though the current MIDI Mode=MULTI. Incoming MIDI will be received on all 16 MIDI channels, to 16 discrete inbound Track/Channels. The default effect algorithm (46 CHORUS + REVERB 2) will be installed, and all Track/Channels will be routed through the effect.

When you now run the external computer or hardware sequencer, you will hear the proper sounds played from the TS-12 as program changes and note/controller data is transmitted to the TS-12 via the **MIDI In** jack.

MIDI Out in General MIDI Mode

The TS-12 keyboard will always play the sound assigned to the currently displayed Track/Channel number. Local playing on the TS-12 keyboard and controllers will be transmitted via the **MIDI Out** jack on the displayed MIDI Channel number. This allows you to connect the TS-12 **MIDI Out** jack to the MIDI In jack of a computer sequencer/hardware sequencer/other MIDI Sound module.

This feature adds MIDI Controller capability to the TS-12 while in General MIDI Mode.

TS-12 General MIDI Parameters

RECV (MIDI Reception) Range: ON or OFF

This parameter is set to receive MIDI data by default (RECV=ON). By changing the RECV value for each MIDI channel, you can define how many Track/Channels you want to receive data via MIDI.

Setting RECV=OFF will disable reception of MIDI notes, controllers and program changes on the displayed MIDI channel. Sounds can still be played from the keyboard, and live playing will still transmit via MIDI on the displayed MIDI channel.

When RECV=OFF, the Track/Channel volume will be set to full on (127), so that your live playing can use the full dynamic range. Resetting RECV to ON will reset the Track/Channel volume back to the General MIDI default value of 100.

Tip: When set to RECV=OFF, this parameter allows for “music-minus-one” applications in General MIDI mode. By setting this parameter to OFF, you disable incoming MIDI for the selected Track/Channel, boost the volume, and can play the assigned sound live from the keyboard as the remaining sequence tracks play back via incoming MIDI.

No matter what the setting of this parameter, a CVP-1 Pedal connected to the **Pedal•CV** Jack will always control the volume of the selected Track/Channel.

GM-CHAN Range: 01 to 16

This parameter is used to select and view the sounds assigned to each MIDI Channel. When this parameter is selected, the **Data Entry Controls** will scroll through all 16 Track/Channels.

GM-CHAN=10 is permanently assigned to play Drum Maps only. When Track/Channel 10 is selected, the GM-PROG parameter will scroll through the nine available GM/GS Drum Maps.

Playing on the TS-12 keyboard will always be transmitted on the displayed MIDI channel. If the GM-CHAN value is changed while a note is held down, local voices will be silenced on the previously selected Track/Channel.

GM-PROG Range: 001 to 128

The GM-PROG (General MIDI Program number) parameter determines which sound will be assigned to each MIDI Channel. When this parameter is selected, the **Data Entry Controls** will change which of the 128 General MIDI ROM Sounds is assigned to the currently displayed Track/Channel. The corresponding Program Change message will be transmitted via MIDI whenever this parameter is edited.

Program Changes received on MIDI channels 1-9 and 11-16 will assign programs to the 16 Track/Channels from the 128 General MIDI sounds in ROM. MIDI Channel 10 can only access the nine GM/GS Drum Maps, and will receive the corresponding GS Drum Map Program change value (1=STANDRD-KIT, 9=ROOM-KIT, 17=POWER-KIT, 25=ELCTRNC-KIT, 26=TR-808-KIT, 33=JAZZ-KIT, 41=BRUSH-KIT, 49=ORCH-PERCSN, 128=MT-32-KIT).

The TS-12 keyboard will always play the sound assigned to the displayed Track/Channel number.

Manually Assigning GM Sounds to Each MIDI Channel

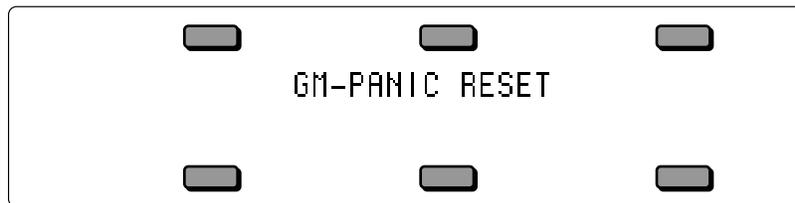
1. Press the soft button beneath the GM-PROG parameter.
2. Use the **Data Entry Controls** to scroll through the different GM Sounds.

The General MIDI Sound names change when you use the **Data Entry Controls**. These sound names and their associated GM Program numbers are listed on the General MIDI Sound Map found earlier in this section.

Note: Most sequence data contains MIDI Program Change messages intended to assign the correct sounds to each MIDI Track/Channel. These incoming MIDI program changes will probably change any manually assigned sounds. If you wish to prevent this from happening, you should disable program change transmission from the external MIDI sequencer.

General MIDI “Panic” button

Some remote MIDI Devices may leave notes and controller values “dangling,” causing Track/Channels to function improperly. The TS-12 has a solution to this problem — the MIDI “Panic” button. Pressing the upper left soft button above GENERAL MIDI MODE will invoke the GM-PANIC RESET function:



“GM-PANIC RESET” will be momentarily displayed. All TS-12 and MIDI voices on all 16 Track/Channels will be silenced. The following MIDI messages will be transmitted on all 16 MIDI Channels: All Notes Off, Reset All Controllers, key-ups for all keys down, sustain and sostenuto pedal ups, and controllers will be normalized to the General MIDI default values. Program Changes will be transmitted corresponding to the sounds assigned to each of the 16 Track/Channels.

System and MIDI Control Settings in GM Mode

The following System and MIDI Control page parameter settings are installed in General MIDI mode (see Sections 2 and 3 for information about these parameters). All other parameters are reset to values appropriate for General MIDI reception:

- **System** page TUNE and PITCH-TABLE settings are retained.
- **System** page TOUCH and VEL-MAX settings are retained.
- **System** page PEDAL is set to VOL.
- **System** page FOOT-SW1-R and SW2-R are set to SUSTAIN.
- **System** page FOOT-SW1-L and SW2-L are set to SOSTENUTO if they were previously set to any value other than *UNUSED*. If they were set to *UNUSED*, they will remain *UNUSED*.
- **MIDI Control** page SYS-EX setting is set to ON.

Exiting General MIDI will restore your original settings.

Disabling General MIDI

To Disable General MIDI

- Press the soft button above *EXIT* to exit General MIDI Mode.

The TS-12 will momentarily show:



The TS-12 will then return to its previous state. The General MIDI Track/Channel sound assignments will be preserved in static RAM, even after power-off.

Note: You can also disable General MIDI by turning the TS-12 off, and then back on (this will not happen if the WAKE-UP parameter is set to GEN-MIDI).

Enabling/Disabling General MIDI with System Exclusive Messages

General MIDI can also be enabled/disabled using Universal System Exclusive (SysEx) messages:

Turning General MIDI On using SysEx Messages

F0 7E <Device ID> 09 01 F7

F0	7E	Universal non-real-time SysEx header
<Device ID>		ID of target device (suggest using 7F: Broadcast)
09		sub-ID #1=General MIDI message
01		sub-ID #2=General MIDI On
F7		EOX (end of SysEx)

Turning General MIDI Off using SysEx Messages

F0 7E <Device ID> 09 02 F7

F0	7E	Universal non-real-time SysEx header
<Device ID>		ID of target device (suggest using 7F: Broadcast)
09		sub-ID #1=General MIDI message
02		sub-ID #2=General MIDI Off
F7		EOX (end of SysEx)

More about SysEx Messages

- The MIDI Control SYS-EX parameter must be set to SYS-EX=ON in order to receive Universal SysEx messages.
- A Universal SysEx General MIDI On message acts the same as answering *YES* to the "ENTER GENERAL MIDI MODE?" prompt, and displays the General MIDI Mode page. The SysEx message will be ignored if the sequencer is running, or if the system is already in General MIDI Mode. Sequencer changes will be saved automatically, unless SAVE-CHANGES=NO (on the third Sequencer Control sub-page).
- If the TS-12 is already in General MIDI mode, a Universal SysEx General MIDI Off message acts the same as pressing *EXIT* on the General MIDI mode screen. This exits General MIDI mode and returns the TS-12 to its previous state.
- When in General MIDI Mode, the Universal SysEx General MIDI Off message is the only SysEx message that will be received; all other SysEx messages are ignored.

Sound Canvas MT-32 Mode Program Change Map

The Roland® MT-32 was an early, pre-General MIDI multi-timbral sound module. It used a different MIDI Program Change Map than General MIDI. The Roland Sound Canvas™ provides an MT-32 Emulation mode, and some Standard MIDI Files are set up to use this. An MT-32 Program Change Map has been included in the TS-12 to provide Sound Canvas MT-32 emulation capability.

Roland products use the Bank Select MSB (MIDI Controller 0) to change sound banks; in the Sound Canvas, sound bank 127 is designated as the MT-32 Emulation mode bank. After the TS-12 has received a Bank Select value of MSB 127, subsequent MIDI Program Changes on that MIDI channel will select the GM Sounds remapped to the Roland MT-32 Program Change Map, as below:

PROG #	INSTRUMENT						
1	GRAND-PIANO	33	NEW-AGE-PAD	65	ACOUSTIC-BS	97	BRASS-SECTN
2	BRITE-PIANO	34	SWEEP-PAD	66	ACOUSTIC-BS	98	VIBRAPHONE
3	ELEC-GRAND	35	CHOIR-AAHS	67	FINGERED-BS	99	VIBRAPHONE
4	ELEC-PIANO2	36	BOWED-	68	SYNTH-BASS2	100	DULCIMER
5	ELEC-GRAND	37	GLASS	69	SLAP-BASS-2	101	TINKLE-BELL
6	ELEC-PIANO1	38	SOUNDTRACK	70	SLAP-BASS-1	102	GLOCKNSPIEL
7	ELEC-PIANO1	39	ATMOSPHERE	71	FRETLESS-BS	103	TUBULR-
8	HONKY-TONK	40	MUSIC-BOX	72	FRETLESS-BS	104	BELLS
			SOLO-VOICE				XYLOPHONE
9	DRWBAR-ORGN	41	POLYSYNTH	73	FLUTE	105	MARIMBA
10	ROCK-ORGAN	42	ICE-RAIN	74	FLUTE	106	KOTO
11	PERC-ORGAN	43	POLYSYNTH	75	PICCOLO	107	BANDONEON
12	DRWBAR-ORGN	44	ECHO-DROPS	76	PICCOLO	108	SHAKUHACHI
13	CHRCH-ORGAN	45	BASS+LEAD	77	RECORDER	109	WHISTLE
14	CHRCH-ORGAN	46	REED-ORGAN	78	PANFLUTE	110	WHISTLE
15	CHRCH-ORGAN	47	GLOCKNSPIEL	79	ALTO-SAX	111	BOTTLE-BLOW
16	ACCORDION	48	SQUARE-	80	SOPRANO-SAX	112	BOTTLE-BLOW
			WAVE				
17	HARPSICHORD	49	STRG-ENSMBL	81	TENOR-SAX	113	TYMPANI
18	HARPSICHORD	50	STRG-ENSMBL	82	BAR-SAX	114	MELODIC-TOM
19	SQUARE-WAVE	51	SYNTH-STR-1	83	CLARINET	115	SYNTH-DRUM
20	CLAVINET	52	PIZZI-STRGS	84	CLARINET	116	SYNTH-DRUM
21	CLAVINET	53	VIOLIN	85	OBOE	117	SYNTH-DRUM
22	CLAVINET	54	VIOLIN	86	ENGLISH-HRN	118	TAIKO-DRUM
23	CELESTA	55	CELLO	87	BASSOON	119	WOODBLOCK
24	CELESTA	56	CELLO	88	HARMONICA	120	REVERSE-CYM
25	SYN-BRASS-1	57	CONTRABASS	89	TRUMPET	121	WOODBLOCK
26	SYN-BRASS-1	58	HARP	90	TRUMPET	122	TINKLE-BELL
27	SYN-BRASS-2	59	HARP	91	TROMBONE	123	ORCH-HIT
28	SYN-BRASS-2	60	NYL-STR-GTR	92	TROMBONE	124	TELEPHONE
29	SYNTH-BASS2	61	STL-STR-GTR	93	FRENCH-	125	BIRD-TWEET
30	HARPSICHORD	62	CLEAN-GUITR	94	HORN	126	BREATHNOISE
31	SAW-WAVE	63	CLEAN-GUITR	95	FRENCH-	127	CRYSTAL
32	SYNTH-BASS2	64	SITAR	96	HORN	128	BREATHNOISE
					TUBA		
					BRASS-SECTN		

After receiving a Bank Select value of MSB 127 on MIDI Channel 10, any subsequent MIDI program changes on MIDI channel 10 will *always* select the MT-32 Drum Map.

Transmitting a Bank Select value of 0-126 MSB will return the MIDI channel to normal MIDI program change reception, selecting sounds from the General MIDI Sound Map as described on

the previous page.

MIDI Controller Implementation in General MIDI Mode

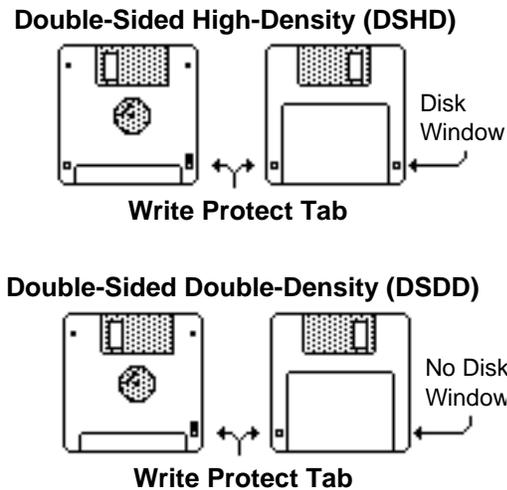
When in General MIDI mode, many of the TS-12 controllers function differently than noted in the MIDI Implementation chart, and are described in the chart on the following page.

General MIDI Mode Controller Implementation Chart

Function...	Transmitted	Recognized	Notes
Velocity Note ON Note OFF	YES YES ¹	YES NO ²	¹ In the TS-12, a Note Off velocity of 64 is always sent for all keys. ² The TS-12 voice architecture does not support Release Velocity.
Aftersustain Key Channel	NO NO	NO NO	
Pitch Bender	YES	YES	Defaults to a value of 64 (center).
Controller 0 (Bank Select MSB)	YES	YES	Always transmitted as 0. An MSB value of 127 received will select the MT-32 Program Change Sound Map.
Controller 1 (Mod Wheel)	YES	YES	Defaults to a value of 0.
Controller 4 (Foot Pedal)	NO	NO	
Controller 6 (Data Entry MSB)	NO	YES	For recognized Registered Parameters only after controllers 100 & 101 are received.
Controller 7 (Volume)	YES	YES	Defaults to a value of 100. Setting RECV=OFF will default the Track/Channel volume to 127. Devices connected to the Pedal•CV jack will control volume.
Controller 10 (Pan)	NO	YES	Defaults to a value of 64 (center).
Controller 11 (Expression)	NO	YES	Defaults to a value of 127. Expression messages received will be responded to as Mix.
Controller 12 (Effect Mod Foot Switch)	NO	NO	
Controller 32 (Bank Select LSB)	YES	NO	Always transmitted as 0.
Controller 38 (Data Entry LSB)	NO	YES	For recognized Registered Parameters only after controllers 100 & 101 are received.
Controller 64 (Sustain)	YES	YES	This defaults to a value of 0. The right foot switch will always function as Sustain.
Controller 66 (Sostenuto)	YES	YES	This defaults to a value of 0. The left foot switch can function as Sostenuto, if a stereo foot switch is connected.
Controller 70 (Sound Variation)	YES	NO	ENSONIQ Patch Selects; values of 0, 32, 64, 127
Controller 71 (Harmonic Content)	NO	NO	ENSONIQ Timbre.
Controller 72 (Release Time)	NO	YES	Defaults to a value of 64 (center).
Controller 73 (Attack Time)	NO	YES	Defaults to a value of 64 (center).
Controller 74 (Brightness)	NO	YES	Defaults to a value of 64 (center).
Controller 75 (Rate)	NO	YES	Defaults to a value of 64 (center).
Controller 91 (External Effects {Reverb} Depth)	NO	YES	Controls effect bus switching and the FX2 wet/dry mix in the General MIDI effect.
Controller 93 (Chorus Depth)	NO	YES	Controls effect bus switching and the FX1 wet/dry mix in the General MIDI effect.
Controller 100 (Reg Param Select LSB)	NO	YES	Values of 0, 1, and 2.
Controller 101 (Reg Param Select MSB)	NO	NO	
Controller 120 (All Sound Off)	NO	YES	Responded to as All Notes Off.
Controller 121 (Reset All Controllers)	YES	YES	Reset Controller messages received will normalize only the controllers supported in General MIDI Mode. It is received independently on each of the 16 General MIDI Track/Channels.
Controller 123 (All Notes Off)	YES	YES	All Notes Off messages received will be responded to regardless of the setting of the ALL-OFF parameter on the MIDI Control page. It is received independently on each of the 16 General MIDI Track/Channels.
Registered Parameters: 0 Pitch Bend Range 1 Fine Tuning 2 Coarse Tuning	NO NO NO	YES YES YES	These Registered Parameters are received independently on each of the 16 General MIDI Track/Channels.

Program Change	YES	YES	0-127.
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The 3.5" disks have a sliding write-protection tab so that you can protect your sounds and sequences against accidental erasure. Sliding the write-protection tab in the lower left corner of the disk so that the window is closed will allow you to store information on the disk. Sliding the tab so that the window is open will protect the disk against being accidentally reformatted or having files deleted. Double-Sided High Density disks can be easily identified because they have an additional window (with no write-protection tab) located on the lower right corner of the disk.



Floppy disks are a magnetic storage medium and should be treated with the same care you'd give important audio tapes. Just as you would use high quality audio tapes for your important recording needs, we recommend using high-quality floppy disks for your TS-12. On the following page are a few Do's and Don't's concerning disks and the disk drive.

Do's:

- Use either Double-Sided High-Density (DSHD) or Double-Sided Double-Density (DSDD) 3.5 inch Micro-floppy disks. Both types are available from almost any computer store and many music stores carry them as well.
- Keep your disks and the disk drive clean and free of dust, dirt, liquids, etc.
- Only transport your unit with nothing in the drive.

Don't's:

- Don't use Single-Sided (SSDD or SSSD) disks. These disks have not passed testing on both sides. While a single-sided disk might work successfully with the TS-12, it is possible that you will eventually lose important data to a disk error if you try using Single-Sided disks.
- Don't put anything other than a disk or the plastic sheet in the disk drive.
- Don't transport the unit with a disk in the drive.
- Don't expose disks to extremes of temperature. Temperatures below 50° F and above 140° F can damage the plastic outer shell.
- Don't expose your disks to moisture.
- Don't dry your disks in a microwave oven.
- Don't subject disks to strong magnetic fields. Exposure to magnetic energy can permanently damage the information on the disk. Keep disks away from speaker cabinets, tape decks, power cables, airline x-ray equipment, power amplifiers, TV sets, and any other sources of magnetic energy.
- Don't eject the disk while the drive is operating (i.e. when the disk drive light is on).

TS-12 Disk File Types

The TS-12 disk storage system has been designed to allow maximum flexibility in saving, loading and organizing your sound and sequence data. Consequently, for each type of data there are several different types of files that can be saved:

Programs:

- 1-PROGRAM — contains a single TS-12 Program.
- 6-PROGRAMS — contains a bank of 6 TS-12 programs, as displayed on the Program Bank pages 0-9. This file type lets you organize programs into groups of six that can be saved and loaded back into any RAM bank you choose.
- 60-PROGRAMS — contains one BankSet of 60 User RAM Programs.
- 120-PROGRAMS — contains all of the User RAM Program memory (both BankSets).

Presets:

- 1-PRESET — contains a single TS-12 Preset.
- 60-PRESETS — contains one BankSet of 60 TS-12 User RAM Presets.
- 120-PRESETS — contains all of the User RAM Preset memory (both BankSets).

Sequence/Song:

- 1-SEQ/SONG — contains a single TS-12 sequence or song.
- 30-SEQ/SONGS — contains 30 TS-12 sequencer locations, saved from either the lower half of the sequencer memory (Banks 0-4) or the upper half (Banks 5-9). A 30-SEQ/SONGS file can be loaded into either the upper or lower half.
- 60-SEQ/SONGS — contains the entire sequencer memory (Banks 0-9) and the global Click and Sequencer Control page settings.

Whenever you save a 30 or 60 Seq/Song file to disk, you will be asked whether you want to also save internal programs (either 60 or the entire 120) in the same file along with the sequencer data. Saving 60 Programs with a 30-SEQ/SONGS file containing Seq/Song Banks 0-4 will save the contents of Program BankSet U0. Saving 60 Programs with a 30-SEQ/SONGS file containing Seq/Song Banks 5-9 will save the contents of Program BankSet U1. Saving 60 Programs with a 60-SEQ/SONGS file will save the contents of Program BankSet U0. A 60 SEQ/SONGS file will also allow you to save the currently loaded contents of the Sample Banks with it. This lets you keep the sequences and their appropriate programs and Sample Banks information together when reloading the data.

MIDI System Exclusive data:

- SYS-EX-DATA — In addition to the above types of TS-12 data, you can use the disk drive to save system exclusive data from other MIDI devices. The TS-12 can thus serve as the “librarian” for your other MIDI gear. This function is covered at the end of this section.

System File:

- SYSTEM-SET-UP — System set-up files let you save the system, or “global” parameters, those contained on the System and MIDI Control pages, so that you can save and re-load a new system configuration in seconds. This is handy if you use the TS-12 in a number of different applications that require different settings for MIDI mode, MIDI base channel, master tuning, etc.

Sampled Sounds:

- SAMPLE-BANKS — remembers up to 20 Sampled Sound names (ten in BankSet 8 and ten in BankSet 9, if applicable) as well as their source disk(s), file paths, and bank locations. Loading a Sample-Banks file will allow you to Auto-Load the Sampled Sound files back into the same location(s) that they were in at the time the Sample-Banks file was saved.
- SAMPLE-EDITS — contains parameter edits of Sampled Sounds.

Disk Capacity — Bytes, Blocks, and Files

The TS-12 has a high-density (HD) drive, allowing you to use both Double-Sided High-Density and Double-Sided Double-Density disks:

- **Double-Density disks** — can store 800 kilobytes of TS-12 data, which translates into about 1600 *Blocks*.
- **High-Density disks** — can store 1600 kilobytes of data, which translates into about 3200 *Blocks*.

A *Block* is a handy unit that the TS-12 uses to measure internal and disk memory — 1 *Block*=512 bytes=256 sample words; 2 *Blocks*=1k bytes; 4 *Blocks*=1k sample words.

TS-12 disk files vary in size — how many will fit on a disk depends on the number and size of the files. Whenever you are on the DISK LOAD page the display shows the size in blocks of each file on the disk. When you are on the DISK SAVE page the display shows the number of free blocks available on the disk in the drive.

Disk Type	High -Density	Double-Density
Kilobytes	1600	800
Sample Words	800k	400k
Blocks	3176	1585

There are limits to the number of files on a TS-12 disk:

- Each disk can hold a *maximum* of 78 files.
- A disk can hold up to 60 files of any one file type, but not more than the total of 78 files of all types for a single disk.

File Banks

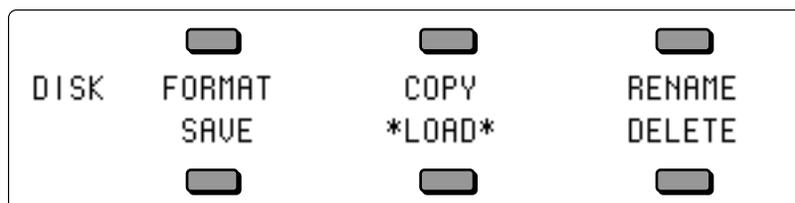
A unique feature of the TS-12 called *File Banks*, allows you to quickly and easily locate the disk file you want to load or delete. *File Banks* provide a graphic way for you to organize and view disk files, and eliminate the need to scroll through long lists of files.

Whenever loading or deleting a file, after you have selected the file type you want, pressing the **10 Bank** buttons beneath the display will cause all the disk files of that type to be shown in groups of six, just like sound or sequence banks. Pressing the soft button next to a file installs that file as the one to be loaded, deleted etc.

When saving data to disk you can, if you wish, specify a particular file bank location for that file to be displayed in. This gives you a high degree of control over how your disk files are organized and displayed.

TS-12 Disk Functions

The TS-12's disk functions are all handled from the Storage page. Press the **Storage** button to get to this page, then press the soft button beneath DISK. When you select DISK from the Storage page, the display shows the disk storage menu:



From here you select which of the 6 disk functions you want:

- **FORMAT** — This formats a blank disk for use with the TS-12.
- **COPY** — This allows you to make a backup copy of an entire TS-12 disk.
- **RENAME** — allows you to change the disk name of a TS-12 disk.
- **SAVE** — save to disk Program, Preset, Sequencer, Sys-Ex Data, System Set-up, or Sampled Sound files.
- **LOAD** — load from disk Program, Preset, Sequencer, System Set-up, or Sampled Sound files; also load System Exclusive data for transmission to a remote MIDI device.
- **DELETE** — allows you to delete (or remove) any file from the disk.

FORMAT — Formatting a Blank Disk

Before a disk can be used by the TS-12 to store data, it must be formatted. Formatting puts information on the disk that the TS-12 needs to read and write files. In addition to formatting a blank disk, the Format procedure can be used to reformat a disk that has been used with some other device, such as a personal computer or another musical instrument. Note that any data (of whatever type) on a disk will be lost when the disk is formatted by the TS-12.

To Format a blank disk:

- Insert a blank, Double-Sided Double-Density or High Density 3.5" micro-floppy disk into the disk drive, with the label-side facing up, and the metal shutter facing away from you. Make sure the plastic write-protect tab is in the closed position (no light showing through the window).
- Press **Storage**.
- Press **DISK**. The Disk Storage menu appears (as shown earlier).
- Press **FORMAT**.
- The display shows:



- Use the **Up/Down Arrow** buttons or the **Data Entry Slider** (or Keyboard Naming if enabled) to change the first character of the name and the left and right soft buttons on the screen to move the cursor to the next character. The last three alpha-numeric characters can only be numbers. Once you have the name that you want:
- **SAVE** saves the name shown into memory (battery backed up RAM). This name is also saved with global parameters when you **SAVE SYSTEM SET-UP** (on the Disk Save page). This is useful for changing the default disk name used for formatting.
- Pressing ***EXIT*** will return you to the Disk Storage page with no harm done.
- Press ***FORMAT*** to proceed. The display shows **FORMAT DISK ALL DISK FILES WILL BE ERASED**. Press ***YES*** to proceed, or ***NO *** to abort the command.
- While the TS-12 is formatting the disk, the display reads **FORMATTING DISK PLEASE WAIT...** The formatting process takes about 80 seconds.
- When the formatting is done, the display reads **DISK COMMAND COMPLETED**, and then you are returned to the Storage page. The disk is ready to accept program, preset, sequencer, system, Sys-Ex, or Sampled Sound data.

FORMAT DISK Error Messages:

There are a number of messages you might encounter while formatting a disk:

- **DISK DRIVE NOT READY** — No disk in the drive.
- **DISK FORMAT FAILURE -- DISK IS UNUSABLE.** This indicates a defective disk. If you get this message we advise that you throw out the disk in question. Try again with another disk.
- **DISK WRITE-PROTECTED** — The plastic write-protect tab in the lower-left corner of the disk must be closed (so you can't see through the hole) before anything can be written to the disk. Close the write-protect tab and try again.

COPY — Making a Backup Copy of a Disk

The COPY function lets you duplicate the contents of one entire disk (the *source disk*) on another disk (the *destination disk*). It is a good practice to regularly back up your valuable data in this way.

Be Careful!

This procedure uses the sequencer memory to temporarily hold the information while copying it between disks. Anything in the sequencer memory before you start will be erased. Save any important sequencer data before copying a disk.

To Make a Backup Copy of a Disk:

- Slide the plastic write-protect tab on the source disk — the original — so that the disk is write protected (you can see through the hole). This is an extra precaution to safeguard the data.
- Press **Storage** and then select **DISK**.
- Press **COPY**. The display shows **SEQUENCER DATA WILL BE ERASED**.
- Press ***YES*** (or press ***NO*** to cancel and save the data before proceeding). The display shows:



- Insert the destination disk (the copy) and press ***OK***. If the destination disk is not formatted, the TS-12 will format it before proceeding.
- After a moment, the TS-12 will ask **INSERT SOURCE DISK**. Insert the write-protected source disk (the original) and press ***OK***.
- The TS-12 will load the data from the source disk into the sequencer memory, and then save it to the destination disk, asking you to insert the appropriate disks as it needs them. Each time, insert the proper disk and press ***OK***. (Note that you can press ***QUIT*** at any time to abort the procedure.)
- The Copy disk procedure requires about three disk swaps with the standard TS-12 memory configuration.
- Once the Copy procedure is successfully done, the display will read **DISK COMMAND COMPLETED**, and then return to the Storage page.

DISK COPY Error messages:

- **DISK WRITE-PROTECTED** — A write-protected disk (window open) was inserted when **INSERT DESTINATION DISK** was displayed. The Destination Disk must have the Write-protect window closed.
- **DISK IS NOT SOURCE DISK** or **DISK IS NOT DESTINATION DISK** — You put the wrong disk in the drive when prompted for a certain disk. This is not fatal; it doesn't abort the Copy procedure. Just insert the proper disk and proceed.

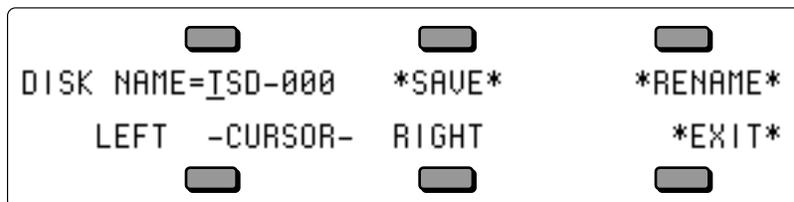
RENAME — Changing a Disk's Name

The RENAME function lets you change the seven character Disk I.D. to a new name. The disk name is used to give each of your TS-12 disks a unique identity. The name of a newly formatted TS-12 disk defaults to TSD-000. Note that you cannot rename a Sampled Sound disk.

- Press **Storage** and then select DISK.
- Press RENAME. The display shows:



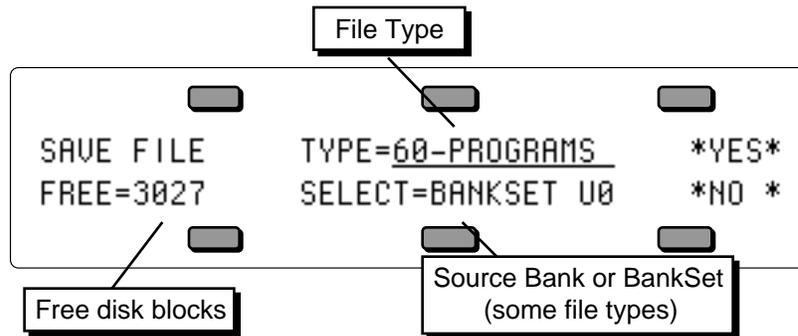
- Select YES to start renaming using the name from the disk in drive as a starting point.
- Select NO to start renaming with your own custom disk name that is currently stored in memory as a starting point.
- After selecting either YES or NO, the display shows the following:



- Use the **Up/Down Arrow** buttons to change the first character of the name and the left and right buttons on the screen to move the cursor to the next character. The last three alphanumeric characters can only be numbers. Once you have the name that you want:
- SAVE saves the name shown into memory (battery backed up RAM) as your custom disk name. This custom disk name is also saved with global parameters when you SAVE SYSTEM SET-UP (on the Disk Save page). Saving a custom disk name allows you to easily rename and format a series of disks by simply updating the number portion of the name.
- RENAME will write the name shown above onto the disk in the drive.
- EXIT will abort this process, without changing the disk name.

SAVE — Saving Data to Disk

When you press SAVE from the Disk Storage menu, you will see the following display:



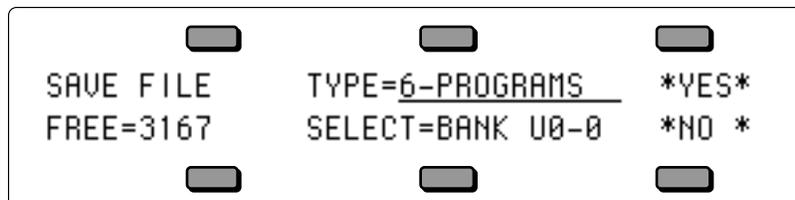
The display shows the *File Type*, the number of free blocks on the disk, and (for some file types) the *Source Bank* or *BankSet*, i.e. which *BankSet* or bank(s) you want to save. Note that you cannot save information to a Sampled Sound disk.

To Save data to disk:

- Insert a formatted TS-12 disk into the disk drive.
- When saving 1-PROGRAM, 1-PRESET or 1-SEQ/SONG, first make sure the program, preset or sequencer location you want to save is selected.
- Press **Storage** to go to the Storage Page.
- Press **DISK**. The Disk Storage menu appears.
- Press **SAVE**. The Save File display appears as shown above. The file type is underlined.
- Select the file type you want to save from among the available types:

1-PROGRAM	1-PRESET	1-SEQ/SONG	SYS-EX-DATA
6-PROGRAMS	60-PRESETS	30-SEQ/SONGS	SYSTEM-SETUP
60-PROGRAMS	120-PRESETS	60-SEQ/SONGS	SAMPLE-BANKS
120-PROGRAMS			SAMPLE-EDITS

- Select a source bank (if applicable). For the file types 6-PROGRAMS and 30-SEQ/SONGS, you will see a SELECT=BANK(s) location beneath the file type, and for the file types 60-PROGRAMS and 60-PRESETS you will see a SELECT=BANKSET location beneath the file type, as shown above. This defaults to the current BankSet (or bank). If you want to save a different BankSet (or bank) than what is showing, select this field and change it using the data entry controls.



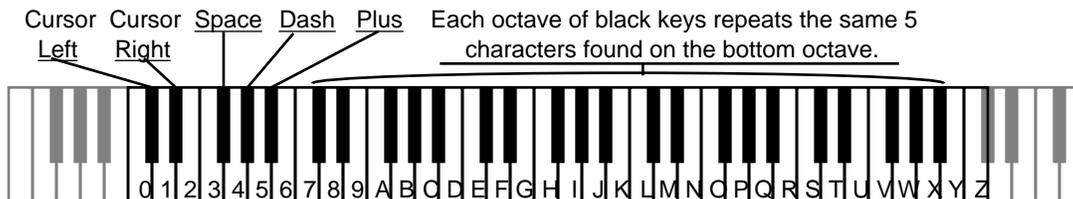
- Press ***YES***. The display shows the Name File page.
- Name the file with a name of your choice using the data entry controls and the two cursor soft buttons, labeled **LEFT** and **RIGHT**, or you can use the keyboard to select characters and move the cursor (see below).
- Press ***YES***. The display reads **SAVING <FILENAME>** while the data is being saved to disk. Or Press ***NO*** to cancel the procedure for any reason. If you are saving a 30-SEQ/SONGS or 60-SEQ/SONGS file there are additional steps (see below).
- If there is a file of that type with the same name already on the disk, the TS-12 will ask

DELETE OLD VERSION? Press *YES* to save the file, replacing the one on the disk. This is for updating files to which you have made changes. Or press *NO* to abort the procedure.

- After the file is saved, the TS-12 returns to the Save File page so that you can save any other files you may want to save at that time.

Naming with the Keyboard

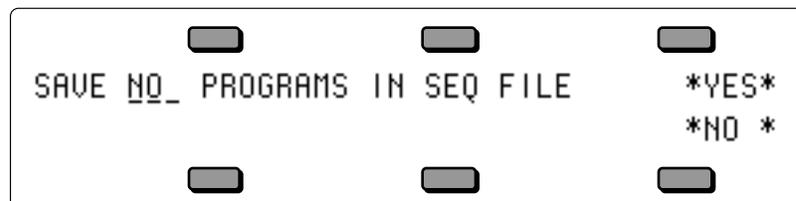
When the KBD-NAMING parameter on the System page is ON, the keyboard can be used for name data entry. Whenever a name field is active, pressing a key on the keyboard will enter the character assigned to that key or move the cursor. The 36 white keys are the digits 0..9 and letters A..Z, while the black keys provide a repeating set consisting of cursor left, cursor right, and 3 punctuation marks (space, dash, and plus). Period, slash, and star are only available using the Data Entry Slider or the Up/Down Arrows.



Saving Programs along with a 30-SEQ/SONGS File

When you save a 30-SEQ/SONGS file, the TS-12 gives you the option of saving Programs in the same file, so that you can keep the sequences and the Programs that go with them together.

After you have selected the 30-SEQ/SONGS file type, chosen either SELECT=BANKS 0-4 or 5-9, and pressed *YES*, the TS-12 offers you an option. The display shows:



Use the data entry controls to select whether (and how many) Programs will be saved in the same file with the sequence data:

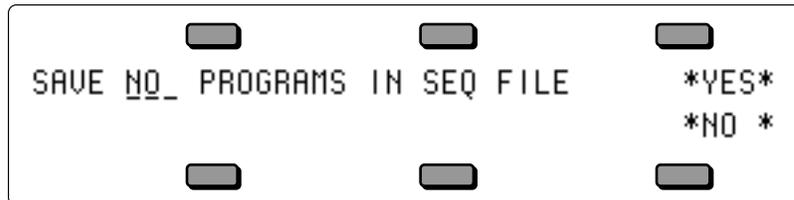
- NO — Only the specified sequencer data will be saved, no Programs.
- 60 — When a 30-SEQ/SONGS file to be saved is from SELECT=BANKS 0-4, the BankSet U0 programs will be saved into the file along with the sequence data. When a 30-SEQ/SONGS file to be saved is from SELECT=BANKS 5-9, the BankSet U1 programs will be saved into the file along with the sequence data. The Programs will automatically be reloaded into the same User RAM location when the 30-SEQ/SONGS file is loaded, replacing the Programs that are there.
- 120 — All User RAM Programs will be saved into the file along with the sequence data (BankSet U0 and U1). The Programs will be reloaded into the internal memory when the 30-SEQ/SONGS file is loaded, replacing the programs that are there.
- After choosing the number of Programs to be saved, press *YES* to proceed.

Note: If Programs have been saved in a Sequencer file along with the sequencer data, when you later go to load the file, a P will flash on the display next to the file name when the file is displayed on the DISK LOAD page. When you answer *YES* to load the data, the TS-12 will load the Programs automatically with the sequencer data. This will over-write the Programs that are in the internal memory. You should always be sure that any Programs you value are saved before loading sequencer files which contain Programs.

Saving Sample-Banks along with a 60 SEQ/SONGS File

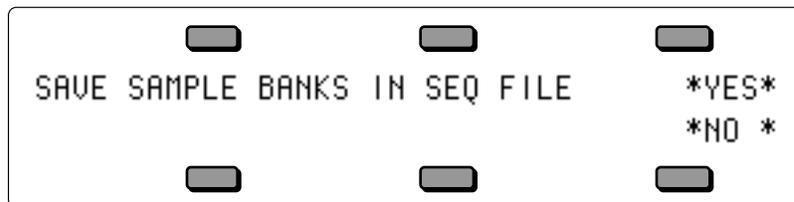
When you save a 60-SEQ/SONGS file, the TS-12 also gives you the option of saving the currently loaded contents of the Sample Banks, as well as the internal User RAM Programs, in the same file, so that you can store the Programs, and Sampled Sound data that the sequences and songs use all together in a single file.

After you have selected 60-SEQ/SONGS file type and pressed *YES*, the TS-12 offers you the first option. The display shows:



Use the data entry controls to select whether or not Programs will be saved in the same file with the sequence data:

- NO — Only the specified sequencer data will be saved, without Programs.
- 120 — All User RAM Programs will be saved into the file along with the sequence data (BankSet U0 and U1). The Programs will be reloaded into the internal memory when the 60-SEQ/SONGS file is loaded, replacing the Programs that are there.
- After choosing whether or not Programs will be saved, press *YES* to proceed. If any Sampled Sounds are currently loaded, the TS-12 offers you the second option. The display shows:



Note: The SAVE SAMPLE BANKS prompt will only appear if there are Sampled Sounds currently loaded into the TS-12.

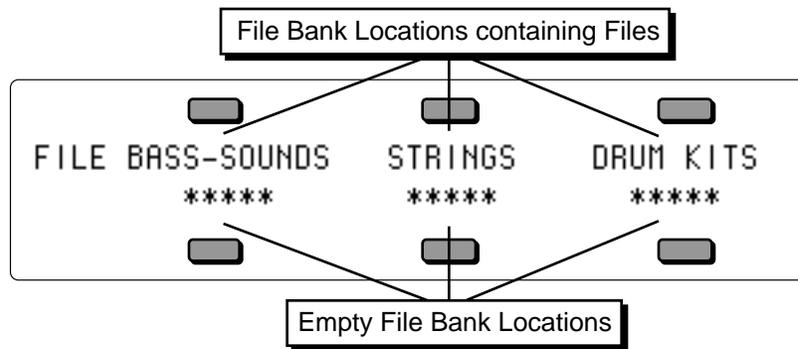
- Answering *YES* will save all of the Sampled Sound names (ten in BankSet 8 and ten in BankSet 9, if applicable) as well as their source disk(s), file paths, and bank locations with the 60-SEQ/SONGS file.
- Answering *NO* will not save the Sample-Banks file with the sequence file.

Specifying a File Bank Location when Saving a File

If you follow the save procedure exactly as described earlier (pressing *YES* after naming the file) the data will automatically be placed in the first empty file bank location for that file type, starting from the first location in Bank 0 and going up from there.

However, you can specify a particular file bank for the file to be placed in:

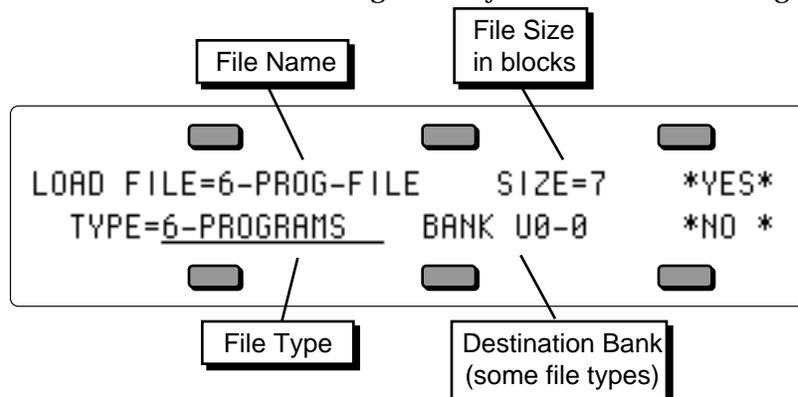
- Press **Storage**, and select DISK, then SAVE. The Save File display appears.
- Select the desired file type and then press *YES*.
- Name the file with the name of your choice.
- Now you can press the **Bank** buttons (0-9) to see the file banks, which show all the files of that type on the disk, six at a time. For example:



- File bank locations containing a file show the file name. Locations that show ***** are empty and are available for saving files to.
- Press the soft button next to any empty file bank location, and the TS-12 will immediately save the file in that location. This lets you organize your files into banks of your choosing for easy access when loading them later.
- If there is a file with the same name already on the disk in a different file bank location, the TS-12 will ask DELETE OLD VERSION? If you press *YES* the TS-12, will delete the original file and save the new one in the new location. Use this to change the bank in which a file is saved.
- Note that when you simply want to update an existing file, but not change its file bank location, it is not necessary to specify the location. Just press *YES* after naming the file and answer *YES* to DELETE OLD VERSION?

LOAD — Loading Data from Disk

When you press LOAD from the Disk Storage menu, you will see the following display:



The display shows the *File Name* which identifies the file that will be loaded if you press *YES*; the *Size* of the file in Blocks; the *File Type* and (for some file types) the *Destination Bank*, i.e. which bank(s) to load the data into. Only files of the type selected will be shown in the File Name field, or in file banks.

To Load a file from disk:

- Insert the disk containing the file data into the disk drive.
- Press **Storage** to go to the Storage Page.
- Press **DISK**. The Disk Storage menu appears.
- Press **LOAD**. The Load File display appears as shown above. The file type is underlined.
- Select the file type you want from among the available types:

1-PROGRAM	1-PRESET	1-SEQ/SONG	SYS-EX-DATA
6-PROGRAMS	60-PRESETS	30-SEQ/SONGS	SYSTEM-SETUP
60-PROGRAMS	120-PRESETS	60-SEQ/SONGS	SAMPLE-BANKS
120-PROGRAMS			SAMPLE-EDITS

Tip: Press the **Storage** button twice to get to the Load File display quickly.

- Press the soft button above the file name and use the data entry controls to find the file you want, or you can use the File Banks to quickly locate the file without scrolling (see below).
- Select a destination bank (if applicable). For the file types 6-PROGRAMS and 30-SEQ/SONGS, you will see a Bank destination, as shown above. For the file types 60-PROGRAMS and 60-PRESETS, you will see a BankSet destination. This defaults to the same BankSet (or bank) the file was originally saved from. If you want a different destination bank, select this field and change it using the data entry controls.
- Press *YES*. The display reads LOADING FILE... while the data is being loaded. Or Press *NO* to cancel the procedure for any reason.
- After the file is loaded, the TS-12 returns to the Load File page so that you can load any other files you may want.

Where the data ends up depends on the file type and (where applicable) the destination bank selected:

- 1-PROGRAM file — once loaded, the program is placed on the Write page, where you can save it to any internal User RAM location as detailed in *Section 8 — Understanding Programs*.
- 6-PROGRAMS file — the bank of 6 programs is loaded into the destination Bank (U0-0 to U1-9) specified before pressing *YES*.
- 60-PROGRAMS file — the 60 programs will be loaded into either BankSet U0 or U1 as specified before pressing *YES*.
- 120-PROGRAM file — replaces all User RAM program memory locations (both BankSets).
- 1-PRESET file — the preset is loaded as the Edit Preset, and can be saved to memory as detailed in *Saving a Preset in Section 4 — Understanding Presets*.
- 60-PRESETS file — will be loaded into either BankSet of preset memory as specified before pressing *YES*.
- 120-PRESET file — replaces the internal preset memory (both BankSet locations).
- 1-SEQ/SONG file — After selecting the single sequence/song file to be loaded and selecting *YES* on the Load File page, you are shown a prompt page which allows you to select the bank location into which the sequence/song file will be loaded. The default value is the first available location, and you may accept this choice, or you may select a different location by using one of two methods. Pressing a **Bank** button will temporarily show the corresponding sequence bank page, and while the bank button is held, you may select the destination Location using the soft buttons. If your selection is a -BLANK- location, the display will revert to the prompt page with the new location selected. You may also directly select the location number using the data entry controls.
- 30-SEQ/SONGS file — the 30 sequence/songs will be loaded into either the lower half of the sequencer memory (Banks 0-4) or the upper half (Banks 5-9), specified before pressing *YES*.

If 60 or 120 programs were saved in a 30-SEQ/SONGS file along with the sequencer data, a **P** will flash on the upper line of the display when the file is displayed on the DISK LOAD page. When you answer *YES* to load the data, the TS-12 will load the programs automatically with the sequencer data, replacing the programs currently in memory.

- 60-SEQ/SONGS file — replaces the entire sequencer memory (Banks 0-9), and installs global Sequencer Control page settings.

Loading 60 SEQ/SONGS Files that Contain Programs and/or Sample Banks

- If only Programs have been saved in a 60-SEQ/SONGS file along with the sequencer data, when you go to load the file, a **P** will flash on the display next to the file name when the file name is displayed on the LOAD FILE page.
- If only Sample Banks have been saved in a 60-SEQ/SONGS file along with the sequencer data, when you later go to load the file, an **S** will flash on the display next to the file name when the file name is displayed on the LOAD FILE page.
- If both Programs and Sample Banks have been saved in a 60-SEQ/SONGS file along with the

sequencer data, when you later go to load the file, a **PS** will flash on the display next to the file name when the file name is displayed on the LOAD FILE page.

To load a 60 SEQ/SONGS file:

- Press **Storage**.
- Press the soft button beneath **DISK**.
- Press the soft button beneath ***LOAD***.
- Use the Data Entry Controls to locate **TYPE=60-SEQ/SONGS**.
- Press the upper left soft button to select the file to load.
- Press the upper right soft button above ***YES***.

If the 60-SEQ/SONGS file had Sample Banks saved with it, after answering ***YES*** to load the 60-SEQ/SONGS file, the Auto-Load prompt will be displayed. If you answer ***YES*** to Auto-Load the Sampled Sound data, the TS-12 will ask for the disk(s) to automatically load the Sampled Sound data. If you answer ***NO ***, the Sampled Sound bank information is loaded and all currently loaded Sampled Sounds are deleted, but the Sampled Sound files are not loaded.

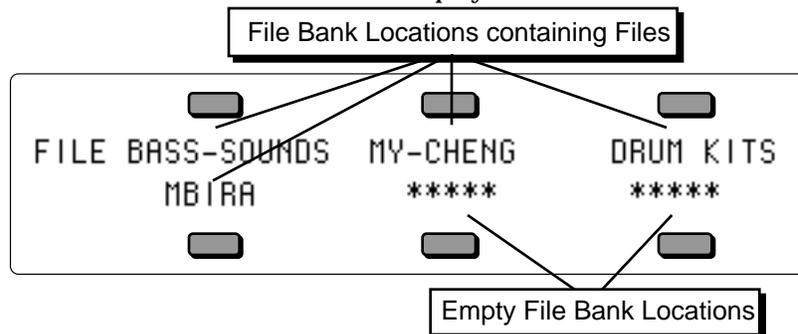
Note: Do not load any 60-SEQ/SONGS files that have been saved with Sample-Banks into a TS-12 that is running software earlier than version 2.0. The new feature is incompatible with older software. To check which software version of the TS-12 you are running, while holding down the **Preset** button, press the **System** button.

Using File Banks to Locate Files for Loading

As we mentioned earlier, File Banks provide a quick way to locate and select a file for loading. After you have selected **LOAD** from the **DISK** Storage menu, the ten Bank buttons will select file banks. From the file banks you can directly select a file to be loaded instead of scrolling through the entire list of files.

Here's how file banks work:

- Press **Storage** and select **DISK**, then **LOAD** to get to the Load File display.
- Select the file type you want to load.
- Press **Bank** button 0 and hold it down. The display shows the first File Bank for that file type:

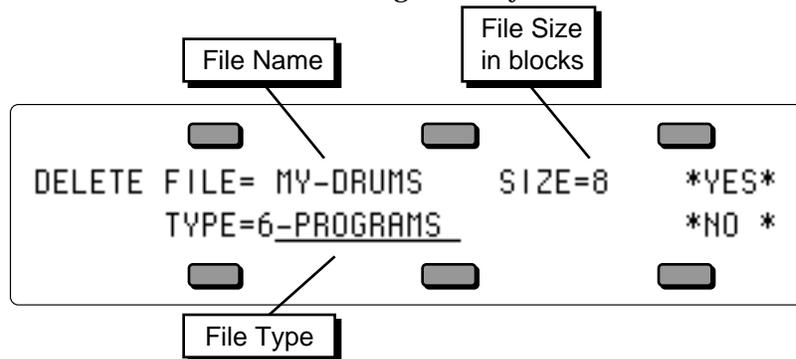


- File bank locations containing a file show the file name. Locations that show ********* are empty and cannot be selected. If you release the **Bank** button, the display remains on the file bank for about 1 second and then returns to the Load File page. This lets you “shop” among the different banks until you find the file you want.
- While the file bank is displayed, press the soft button next to the name of the file you want load. This selects that file as the one to be loaded and instantly returns you to the Load File page.
- Press ***YES*** to load the selected file.

Note: On the Load File page, you may notice another type called **DIAGNOSTICS**. This is for use by ENSONIQ manufacturing for quality testing/troubleshooting, and is not for use by the end-user.

DELETE — Deleting (Erasing) Files from Disk

When you press DELETE from the Disk Storage menu, you will see the following display:



The display shows the *File Name* which identifies the file that will be deleted if you press *YES*; the *Size* of the file in Blocks; and the *File Type*. Only files of the type selected will be shown in the Name field, or in the file banks. Note that you cannot delete any data from a Sampled Sound disk.

To Delete a file from disk:

- Insert the disk containing the file to be deleted into the disk drive.
- Press **Storage** to go to the Storage page.
- Press **DISK**. The Disk Storage menu appears.
- Press **DELETE**. The Delete File page appears as shown above. The file type is underlined.
- Select the file type you want from among the available types.
- Press the soft button above the file name and use the data entry controls to find the file you want to delete. (Or you can press the **Bank** buttons (0-9) and use the File Banks to select the file without scrolling, just as when loading.)
- Press *YES*. The display asks DELETE <FILE NAME>, and warns <FILE TYPE> FILE WILL BE ERASED.
- Press *YES*. The display reads DELETING <FILE NAME>... while the file is being removed. Or press *NO* to cancel the procedure for any reason.
- After the file is deleted, the TS-12 returns to the Delete File page so that you may delete any other files you may want. If you have no more files to delete, press *NO* to exit.

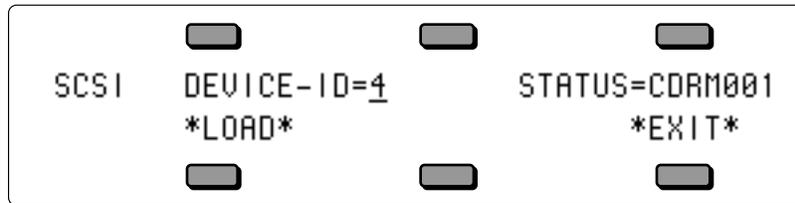
SCSI Option (read-only)

A SCSI option is available for loading Sampled Sounds from EPS/EPS-16 PLUS/ASR-10 format SCSI Storage Devices when the optional SP-4 interface is installed. The TS-12 SCSI port will only read from SCSI; it will not write to SCSI Storage Devices. When the SP-4 is installed, the STORAGE page will display a new active field, as below:

```

SELECT STORAGE OPTION          *LOAD*
      SCSI          DISK          SYS-EX
  
```

Pressing the lower left soft button beneath SCSI will reveal the following sub-page:



This is the SCSI STATUS page, where you select the SCSI DEVICE ID from which you want to load Sampled Sounds. It is important that each SCSI Storage Device in a SCSI network be assigned a unique SCSI Device ID number — this will ensure predictable communication between devices. Since the range of valid SCSI IDs is 0 to 7, it is possible to connect up to eight distinct devices on a single network. The TS-12 is permanently assigned to Device ID #3, so no other devices in the SCSI network can be assigned to Device ID #3.

The STATUS field will show one of five different values:

- INVALID - there is no device mounted on the current SCSI Device ID number
- FOREIGN - the volume on the current SCSI Device ID number is not an ENSONIQ format
- AUDIOCD - an Audio CD volume is on the current SCSI Device ID number.
- STANDBY - a removable media device is mounted on the current SCSI Device ID number, but it contains no volume
- UNNAMED - an unnamed ENSONIQ format volume is on the current SCSI Device ID number
- xxxx### - 7 character ENSONIQ volume name

Pressing *LOAD* will display the lowest numbered Sample Sound file or Directory name in the Root directory of the selected SCSI Storage Device. If no Sampled Sound files exist in the current directory, the file TYPE parameter will be automatically set to TYPE=DIRECTORY, and the lowest numbered directory name will automatically be displayed. If no sub-directories exist in the current directory, the file TYPE parameter will be automatically set to TYPE=SAMPLEDSND and the lowest numbered Sampled Sound file will be displayed.

```

LOAD FILE=SOUND-NAME          *YES*
TYPE=DIRECTORY DIR=ROOT      *NO *
  
```

Tip: Pressing **Storage** then *LOAD* , or pressing **Storage** twice, will display the contents of the last viewed directory.

After the directory from a SCSI device has been loaded, pressing **Storage**, then the soft button beneath SCSEI, and the soft button beneath *LOAD* will always display the contents of the Root directory.

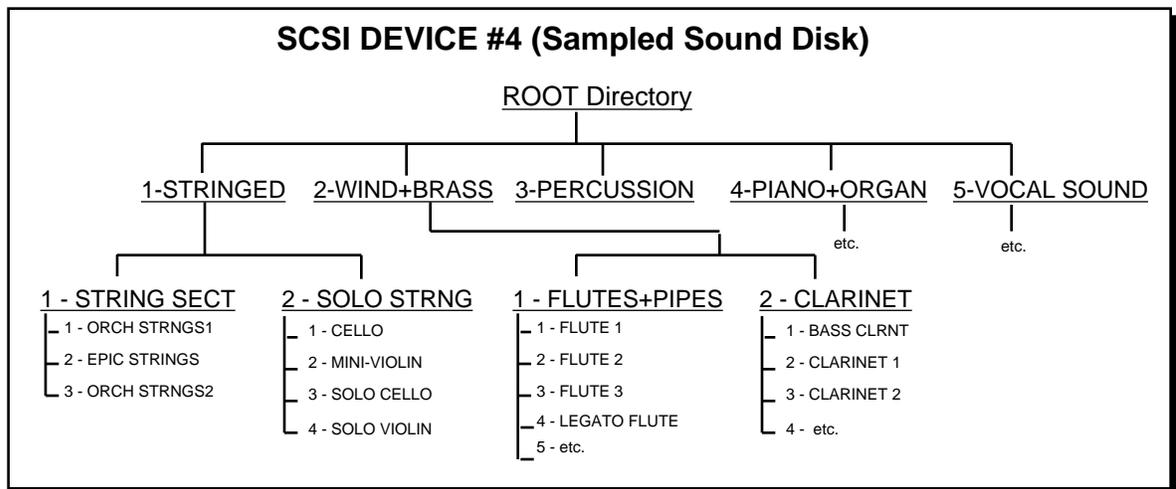
Directories

What is a Directory?

Files on Sampled Sound disks are organized in directories. A directory is a group of up to 38 files. These files can be one of two possible file types: a Sampled Sound or another directory (called a sub-directory). Each sub-directory may contain up to 38 more files. If there are no sub-directories, the disk will only contain the 38 files of the Root (or Main) directory. The Root directory is the default top level directory selected when you change SCSI DEVICE ID numbers on the SCSI STATUS page or after power-up. If you are familiar with the Macintosh computer, or MicroSoft Windows™ for IBM/PC Compatibles, sub-directories are similar to folders.

The directories and sub-directories on a Sampled Sound disk form a tree-like structure, with the Root directory as the trunk, and the various levels of sub-directories conceptually similar to the branches of the tree. For example:

Example Directory Structure



Navigating in Directories

File Paths

It is helpful to have an understanding of how the TS-12 keeps track of all the files that can be on a large Sampled Sound disk like a CD-ROM. If we were to describe the location of the sound SOLO VIOLIN in the Example Directory Structure diagram above, we might say:

“The SOLO VIOLIN Sampled Sound file is the fourth file in the SOLO STRING sub-directory, within the STRINGED directory, which is in the ROOT directory, on the SCSI Storage Device assigned to DEVICE-ID #4.”

If we read the description from right to left, starting with the SCSI Storage Device, it becomes:

SCSI DEVICE-ID 4..ROOT..STRINGED..SOLO STRNG..SOLO VIOLIN

This description of the location of the file is called a file path. This is the path that the TS-12 will follow to find the file. If you use an IBM PC/Compatible running under MS-DOS, you may already be familiar with file paths (e.g. C:\STRINGED\SOLOSTRNG\SOLOVIOL). On a Macintosh computer, or an IBM PC/Compatible running Microsoft Windows, the file path would correspond to the cascade of the folders you would open in order to locate a file.

To Enter or Move Down into a Directory

- Press the **Storage** button.
- On the SELECT STORAGE OPTION page, press the soft button beneath the word SCSI to reveal the following sub-page:

```

SCSI  DEVICE-ID=4      STATUS=CDROM01
      *LOAD*           *EXIT*

```

- If the STATUS is a valid volume, press the soft button beneath the word *LOAD*. This takes you to the LOAD FILE page.
- When FILE TYPE=DIRECTORY on the LOAD FILE page, you can view the contents of the Root directory, and select a sub-directory by using the Data Entry Controls, and pressing *YES*. The display momentarily shows LOADING <Directory>, and then shows the LOAD FILE page with either Sampled Sound files or another sub-directory selected.
- You can continue to select other Sampled Sound files or sub-directories using the Data Entry Controls and pressing the *YES* button to load them.

To Exit from or move back up from a Directory:

- On the LOAD FILE page, press the lower left soft button beneath the TYPE value.
- Press the **Down Arrow** button to set TYPE=DIRECTORY. The display shows *EXIT* on the top of the display.
- Press the top middle soft button above *EXIT* to exit the current sub-directory level, and return you to its parent directory.

Tip: To quickly return to the Root Directory, press the **Storage** button, the soft button beneath SCSI, and then the soft button beneath *LOAD*.

Direct-Macros™

What Is a Direct-Macro?

It may have occurred to you that with the large number of files that a SCSI Storage Device can contain, it would be nice to be able to get directly to a directory or specific file quickly rather than having to scroll through all of the files and manually enter each directory and sub-directory. Direct-Macros allow you to do this. In the TS-12, a Direct-Macro is a shortcut that allows you to get to a file or directory on a Sampled Sound CD ROM with just a few button presses.

Direct-Dialing Macros on Sampled Sound CD ROMs

ENSONIQ formatted Sampled Sound CD ROMs have a unique Direct-Macro number assigned to each individual file location (see the CD-ROM manual for Direct-Dial listings). Pressing and holding the top left soft button above the LOAD FILE name field, and then pressing the **Bank** buttons, allows direct-dialing of Direct-Macro numbers. The following screen will be displayed after a **Bank** button has been pressed, for as long as the top left soft button is held down:



Letting go of the top left soft button will invoke the Direct Macro for the value that is displayed. Direct-Macro numbers conform to the ENSONIQ CD-ROM conventions:

- 1 digit is meaningless and does nothing.
- 2 digits selects files by number in the current directory.
- 3 digits changes to a new sub-directory within the current directory (the 1st digit), and then selects a file by number in the new sub-directory.
- 4 digits changes to a new main directory (the 1st digit), and then selects a sub-directory and file by number in the new main directory.
- 5 digits changes SCSI Device ID numbers (the 1st digit), and then selects a main directory, sub-directory and file by number on the new SCSI Storage Device.

If we were to locate the sound SOLO VIOLIN in the Example Directory Structure using the Direct-Dial feature, you would enter 41204:

This number:	4	1	2	04
selects:	SCSI DEVICE ID 4	STRINGED	SOLO STRING	SOLO VIOLIN
which is:	SCSI DEVICE-ID	Main Directory	Sub-Directory	File Number

Note: All Direct-Macro operations are performed with the top left soft button above the file name held down, and take effect when the **button is released**.

It is not necessary to enter the SCSI Device ID digit unless you are changing SCSI Storage Devices. When working with a CD-ROM, four digits are all you need to enter, because CD ROM drives containing ENSONIQ CD-ROMs should always be set to SCSI ID #4. If you make a mistake, type up to six digits; the sixth digit entered will start over at the first digit of your next attempt.

MIDI SYS-EX

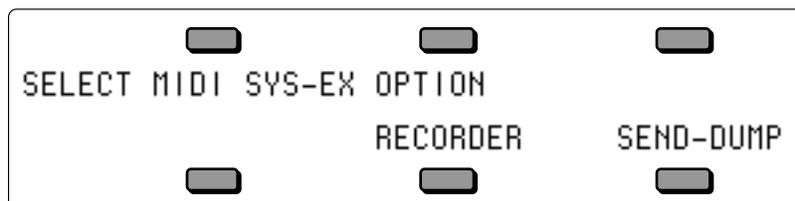
To Send MIDI Sys-Ex Messages to another TS-12

The TS-12 is able to send System Exclusive dumps of Programs and Presets, either singly or in banks, as well as Sequencer dumps containing either the entire sequencer memory or the current sequence/song. These dumps can be understood by another TS-12.

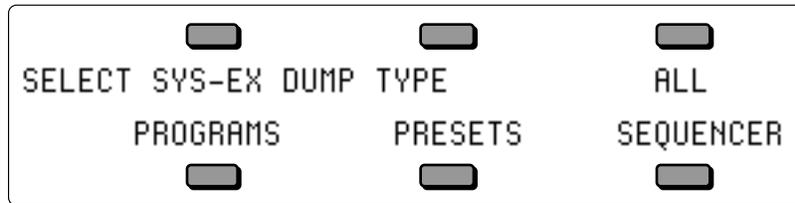
Banks of programs or presets are always transmitted from the internal RAM. If you want to send internal ROM data, you must first replace all of the internal RAM data with copies of the internal ROM data. Make sure that you have first saved your internal RAM data before replacing it with the ROM data.

From the STORAGE page:

Press the soft button for SYS-EX. The display reads:



This page is used to select either the Sys-Ex Recorder, or the option to transmit bulk Sys-Ex dumps of data in RAM. Pressing the soft button below SEND-DUMPS will reveal the following sub-page:



PROGRAMS

To Send Programs out via MIDI Sys-Ex

From the MIDI SYS-EX page:

- Press the soft button for PROGRAMS. The display reads:



- **CURRENT PROGRAM** — this command will send out all data for the currently selected primary Program as a system exclusive message. The Program may be in any bank, including the ROM BankSets, or may be in the Compare buffer.
- **BANKSET-U0** — this command transmits the contents of User RAM Program BankSet U0 as a system exclusive message. The dump contains data for 60 Programs.
- **BANKSET-U1** — this command transmits the contents of User RAM Program BankSet U1 as a system exclusive message. The dump contains data for 60 Programs.
- **ALL** — this command transmits the contents of both User RAM Program BankSets U0 and U1 as a system exclusive message. The dump contains data for the complete set of 120 RAM Programs.

PRESETS

To send Presets out via MIDI Sys-Ex

From the MIDI SYS-EX page:

- Press the soft button for PRESETS. The display reads:



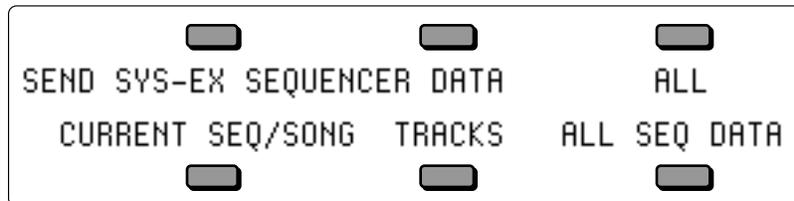
- **CURRENT PRESET** — will send out all data for the current Preset as a system exclusive message. The Preset may be in any bank, including the ROM BankSets, or may be in the Preset Edit buffer.
- **BANKSET-U0** — this command transmits the contents of User RAM Preset BankSet U0 as a system exclusive message. The dump contains data for 60 Presets.
- **BANKSET-U1** — this command transmits the contents of User RAM Preset BankSet U1 as a system exclusive message. The dump contains data for 60 Presets.
- **ALL** — this command transmits the contents of both User RAM Preset BankSets U0 and U1 as a system exclusive message. The dump contains data for the complete set of 120 RAM Presets.

SEQUENCER DATA

To Send Sequences/Songs out via MIDI Sys-Ex

From the MIDI SYS-EX page:

- Press the soft button for SEQUENCER. The display reads:



- **CURRENT SEQ/SONG** — will send out all data for the currently selected sequence or song as a system exclusive message.
- **TRACKS** — transmits all information about the 12 tracks and the effect in the current sequence or song (not including recorded track data) as a system exclusive message. If received by a TS-12, it will change the effect and reconfigure the tracks of the current sequence or song.
- **ALL SEQ DATA** — transmits the contents of the ten Sequencer Banks as a system exclusive message. The dump contains data for the complete set of 60 sequencer locations.

ALL

Sending Programs, Presets and All Sequencer data out via MIDI Sys-Ex

From the MIDI SYS-EX page:

- Press the soft button for ALL. The TS-12 will transmit three consecutive dump messages containing both User Program BankSets (U0 and U1), both User Preset BankSets (U0 and U1), and the entire Sequencer memory. Using this command is equivalent to sending the three messages individually, and is convenient when you wish to transmit everything with one command.

Receiving MIDI Sys-Ex Messages

The receiving of data dumps is initiated automatically by System Exclusive messages sent from the transmitting unit. No front-panel commands are necessary to receive dumps if the receiving of System Exclusive messages is enabled on the MIDI Control sub-page (SYS-EX=ON).

MIDI System Exclusive Recorder

What are System Exclusives?

Some MIDI information—such as key events, controllers, program changes, etc.—is understood by virtually all MIDI devices, regardless of the manufacturer. The common ability to send and receive these messages is what allows you to play any MIDI synth from any other, to change programs and volume remotely, to start and stop sequencers and drum machines together, and the many other performance miracles we have come to expect from MIDI.

There are other messages which each manufacturer has reserved for communicating specific information with a specific machine (or family of machines). These machine-specific messages are called *System Exclusive* (or *Sys-Ex*) messages, since they are meant to be recognized only by a particular device and ignored by all others (i.e. they are exclusive to a particular system).

The TS-12, for example, can transfer programs, presets or sequences or via to another TS-12. It is a lot like sending a file from one computer to another via modem. The 1's and 0's that make up the data in memory are sent out the MIDI port. This data can be received and understood by another TS-12, or by a computer running the proper librarian software.

“Generic” System Exclusive Storage

It is not strictly necessary, however, for the receiving system to understand the data it receives, if the purpose is to store it for later reloading into the original system (just as it's not necessary for a file cabinet to understand the pieces of paper you file there). The TS-12 can receive any MIDI System Exclusive message up to 288k bytes and save it to disk without having the slightest notion of what it means or what type of device it came from. When you want to send the data back to the original device, you just load the data from disk back into the TS-12, which will then re-transmit the message exactly as it was received.

Here are a few examples of the kinds of information which you can use the TS-12 to store in this way:

- The Program (patch) memory of virtually any MIDI synthesizer
- The pattern memory of a drum machine
- The sequence memory of a MIDI sequencer
- The preset memory of any MIDI effects device which can send and receive it (such as the ENSONIQ DP/4)

In short, any MIDI data (within memory limits) which can be transmitted from one device to another can be received and stored by the TS-12. With the TS-12 at the heart of your system, you now have disk storage for the data in all your MIDI instruments.

Saving Sys-Ex data uses the Sequencer Memory

The TS-12 uses the RAM (Random Access Memory) that is normally devoted to the sequencer to “buffer” incoming System Exclusive messages before saving them to disk. A buffer is an area of memory where data is held temporarily. When the TS-12 receives a System Exclusive data dump, it stores it in the sequencer memory until you save the data to disk.

Important:

You must save all sequencer memory before using the System Exclusive Recorder function to receive data.

Loading Sys-Ex data from disk to an external device will not necessarily clear the sequencer memory. If there is enough unused sequencer memory to load and transmit the Sys-Ex message, the memory will not be affected. If there is not enough memory, the TS-12 will warn you, and give you a chance to proceed (erasing the sequencer memory) or quit and save the data.

SAVING System Exclusive Data from an External Device

Using the TS-12's disk drive for storing data from external devices is a three-step process:

- 1) First you get the TS-12 ready to receive the data via MIDI;
- 2) next, you send the data from the external MIDI device to the TS-12; and finally
- 3) you save the data to a formatted disk with the TS-12's disk drive.

To Save System Exclusive Data from an External MIDI Device:

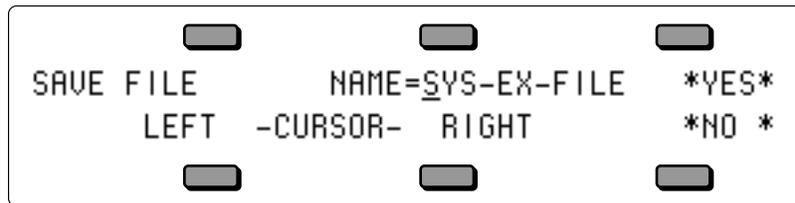
- Connect the MIDI Out of the sending device to the MIDI In of the TS-12.
- Insert a formatted double-sided 3.5" disk into the TS-12 disk drive.
- Press the **Storage** button to select the Storage page.
- Press DISK. The Disk Storage menu appears.
- Press SYS-EX REC.
- The display shows SEQUENCER DATA WILL BE ERASED to warn you that any sequences and songs currently in memory will be lost. It's not too late, however, to quit and preserve the sequencer memory intact. Pressing *NO* at this point will return you to the Storage page without erasing the sequencer memory, allowing you to save it to disk before proceeding.
- Press *YES* to proceed. The following screen appears:



The TS-12 will now record into its memory any System Exclusive message which it receives. At the upper right of the display (SIZE=##) you see the size (expressed in disk blocks) of the Sys-Ex data received so far.

- > Pressing SAVE lets you name and save to disk what has been received so far (don't do that yet).
 - > Pressing SEND will retransmit whatever has been received so far (don't do that yet either).
 - > Pressing *EXIT* returns you to the Storage Page.
- From the external MIDI device, transmit the System Exclusive data. The display will read STATUS=RECEIVING.... while the data is being sent.
 - When the full message has been received, the display will read STATUS=COMPLETE to indicate that a complete message was recorded. The display shows how many blocks of data have been received so far. At this point, assuming there's enough memory, you can send the TS-12 another System Exclusive message (from a different instrument, for example) which will be stored right after the first one. You can save as many different messages as memory permits in a single Sys-Ex block. Each time, the TS-12 will read STATUS=RECEIVING... and then return with STATUS=COMPLETE when the complete message has been received. When the data is later retransmitted, all the messages will be sent out in the order they were received, with a 100 millisecond pause between each. In this way you could load new data into all your devices with a single Load command from the TS-12.

- Once you have successfully received the Sys-Ex message (or messages), press SAVE. The standard SAVE FILE display appears:



- Name the file with an 11-character name of your choice using the data entry controls and the two cursor soft buttons, labeled LEFT and RIGHT. (Or you can use the keyboard to select characters and move the cursor, if Keyboard Naming is enabled on the System page).
- Press *YES*. The Display reads SAVING <FILENAME> while the data is being saved. Or Press *NO* to cancel the procedure for any reason.
- If there is a Sys-Ex file with the same name already on the disk, the TS-12 will ask DELETE OLD VERSION? Press *YES* to save the file, replacing the one on the disk. This is for updating files to which you have made changes. Or press *NO* to abort the procedure.
- After the file is saved, the TS-12 returns to the SAVE FILE page, so that you can save a backup copy of the data to a different disk if you wish. Press *NO* (or any other front panel button) to exit.

Note: If during the reception of Sys-Ex data, the TS-12 display reads STATUS=INCOMPLETE, this means it did not receive an “End Of Exclusive” after the System Exclusive message. This would indicate that the external MIDI device did not transmit a complete message for some reason. Press *EXIT* and try again.

If the TS-12 display reads STATUS=MEMORY FULL, this means it ran out of memory with which to “buffer” the incoming data (the maximum amount which can be received is 256, 767 with expanded memory, blocks for a standard TS-12). After receiving the Memory Full message you can still save the file, but it is almost certain that the last Sys-Ex message received is incomplete and will not be able to be received successfully when retransmitted.

LOADING System Exclusive Data from Disk to an External Device

After you have saved a System Exclusive message from an external MIDI instrument, getting the data back to the original instrument involves three steps:

- 1) First you prepare the receiving instrument(s) to receive System Exclusive messages via MIDI;
- 2) next, you Load the data from the TS-12's disk drive into memory; and then
- 3) you send (transmit) the data to the remote MIDI device(s) from the TS-12.

To Load and Transmit a System Exclusive File from disk:

- Connect the MIDI Out of the TS-12 to the MIDI In of the receiving device(s).
- Enable the receiving instrument(s) to receive System Exclusive messages. Many devices have a switch or a parameter which enables or disables the receiving of System Exclusive messages. Consult the manual of each particular device for details.
- Insert the disk containing the Sys-Ex data into the disk drive.
- Press **Storage** to select the Storage page.
- Press DISK. The Disk Storage menu appears.
- Press LOAD. The Load File display appears as shown earlier. The file type is underlined.
- Use the data entry controls to select the file type SYS-EX DATA.
- Press the soft button above the file name and use the data entry controls to find the file you want to transmit (or use the File Banks to quickly locate the file without scrolling as detailed earlier in this section).

- Press *YES*.
- If there is not enough free sequencer memory to hold the Sys-Ex data, the display shows SEQUENCER DATA WILL BE ERASED. If you have sequencer data in memory which hasn't been saved, press *NO* to return to the Storage page and save it to disk before proceeding. Otherwise, press *YES*.
- The display reads LOADING <FILENAME> while the data is being loaded. Once the data is in memory, the Sys-Ex Recorder screen appears:



- Press SEND to transmit the data. The display reads STATUS=SENDING, and then returns to STATUS=READY..., ready to send the data again if necessary.
- Check the receiving instrument(s) to see that the data was received correctly. If it wasn't, make sure that:
 - > the MIDI connections are correct (TS-12's MIDI Out to the receiving device's MIDI In),
 - > the receiving device(s) is enabled to receive System Exclusive messages,
 - > the receiving device(s) is set to the same MIDI base channel(s) as when the data was initially sent to the TS-12.
- Then press SEND again, and the data will be transmitted again. You can keep repeating this until the data has been successfully received by the remote device(s).
- Once the data has been successfully transmitted, press EXIT.

Additional Sys-Ex Recorder Notes

As you have no doubt noticed, the TS-12 displays exactly the same page for sending and receiving Sys-Ex data. In fact, MIDI System Exclusive data can be transmitted or received any time this page is on the display, regardless of which way you entered it.

Whenever this page is displayed:

- Pressing SEND will transmit whatever is in the MIDI Sys-Ex buffer.
- Incoming MIDI Sys-Ex messages will be recorded and added to the data already in the buffer memory.
- Pressing SAVE will always take you to the SAVE FILE page where you can name and save to disk the data in the buffer memory.

This allows a number of useful applications. You can, for example, load a Sys-Ex file from disk, then transmit to the TS-12 any additional message or messages, adding that data to the original data, and then resave the file to disk. Or you can press SEND to retransmit a Sys-Ex message immediately after it has been received, to check and see that it was received properly.

TS-12 Disk Messages

Disk messages are displayed for one second and indicate either successful completion or non-fatal error conditions encountered during a disk operation:

- **DISK COMMAND COMPLETED** — indicates that the disk operation was completed successfully and without errors.
- **DISK WRITE-PROTECTED** — appears during **SAVE** or **DELETE** operations if the diskette is write-protected.
- **DISK HAS BEEN CHANGED** — appears when you respond ***YES*** to **LOAD**, **SAVE** or **DELETE** when the disk in the drive has been changed since the last time the TS-12 loaded a disk directory.
- **DISK DRIVE NOT READY** — usually indicates that there is no diskette in the drive, although it can indicate a hardware problem if it persists.
- **NOT ENOUGH DISK SPACE** — indicates that there are not enough available sectors on diskette to save the file.
- **FILE DOES NOT EXIST** — appears when you respond ***YES*** to **LOAD** or **DELETE** when the display shows **FILE=*NO FILES***.
- **DISK COMMAND NOT COMPLETED** — appears when you respond ***NO*** to **DELETE OLD VERSION?** when saving files.
- **NO FREE DISK FILES** — indicated that there are no free directory entries in which to save the file.
- **NO SYS-EX DATA TO SAVE** — indicates that there is no data in the Sys-Ex Recorder to save.
- **SEQUENCER MEMORY RESET** — appears after using the Sys-Ex Recorder (which erases sequencer memory) and you try to enter a sequence.
- **FILE TOO LARGE TO LOAD** — indicates that the sequence data in the file will not fit into the free memory. Delete sequences or songs to make some memory available. If that does not work, the file may have been saved from a system with expanded memory.
- **INCOMPATIBLE DISK CAPACITY** — appears when copying an HD disk's contents to a DD disk, or vice versa.
- **NOT ENOUGH SOUND RAM INSTALLED** — appears when you try to Auto-Load a **SAMPLE-BANKS** file that was created on an 8 Meg TS-12 into a 2 Meg unit.

Note: Any Sample-Banks files created on an 8 Meg TS-12 using BankSet S9, and then loaded into a 2 Meg unit will automatically erase all Sampled Sounds in BankSet S9.

Fatal Error Messages

Fatal error messages are always accompanied by the **PRESS ANY BUTTON TO CONTINUE...** prompt, and remain on the screen until any button is pressed. These messages indicate serious error conditions which interrupted the disk operation. These errors may have prevented the correct saving or loading of the data in the file(s).

- **DISK DRIVE NOT READY** — indicates either that there is no diskette in the drive or that there are hardware problems.
- **DISK NOT FORMATTED** — the disk format was not recognized, and the disk is either blank or formatted for some other system.
- **NOT TS-12 DISK** — the disk format was recognized, but the disk does not contain TS-12 data.
- **DISK ERROR - WRITE VERIFY** — during a **SAVE** operation, the data written could not be verified. Probably indicates a bad disk sector. The file may be unusable.
- **DISK ERROR - LOST DATA** — during a disk read operation, the system missed data coming from the disk. Probably indicates a hardware problem. The file may be unusable.

- **FILE OPERATION ERROR** — one of a number of possible fatal errors occurred during a disk operation. Probably caused by a low-level hardware or software error, although the disk may be bad.
- **DISK ERROR - BAD DATA** — during a file operation, the CRC (error checking code) of the data block was incorrect. Probably indicates a bad disk sector. The file may be unusable.
- **DISK ERROR - BAD DISK OS** — during a file operation, the CRC of the Disk OS Program Control Block was incorrect. Probably indicates a bad disk sector. The disk may be unusable.
- **DISK ERROR - BAD DIRECTORY** — during a file operation, the CRC of the Directory blocks was incorrect. Probably indicates a bad disk sector. The disk may be unusable.
- **DISK ERROR - BAD FAT** — during a file operation, the CRC of the FAT (File Allocation Table) block was incorrect. Probably indicates a bad disk sector. The disk may be unusable.
- **DISK ERROR - BAD DEVICE ID** — during a file operation, the CRC of the Device ID block was incorrect. Probably indicates a bad disk sector. The disk may be unusable.
- **FORMAT FAILED - BAD DISK** — during formatting, a bad disk sector was detected. The disk may be defective, and should not be used.
- **DISK COPY NOT COMPLETED** — appears if *QUIT* is pressed during the Disk Copy procedure.
- **INVALID SCSI DEVICE** — indicates that there are problems either with the connected SCSI Device, with the SCSI cable, or that the SCSI Storage Device is set to the wrong SCSI Device-ID number.

Section 14 — Understanding Sampled Sounds

This section provides an overview of the concepts behind understanding and editing a Sampled Sound. For detailed descriptions of the actual parameters, refer to the following section.

What is a Sampled Sound?

A Sampled Sound is a sound created for ENSONIQ's EPS, EPS-16 PLUS, and/or ASR-10 samplers, giving you access to the largest library of sampled sounds anywhere! In addition to having access to this versatile library of sounds (from ENSONIQ and many third-party companies from around the world), this means that you can incorporate vocals, drum loops, and any sound imaginable into your music. Just use an ENSONIQ sampler, or your friend's ENSONIQ sampler, to make new Sampled Sounds to use in your music.

Sampled Sounds differ from the TS-12's on-board sounds in several significant ways.

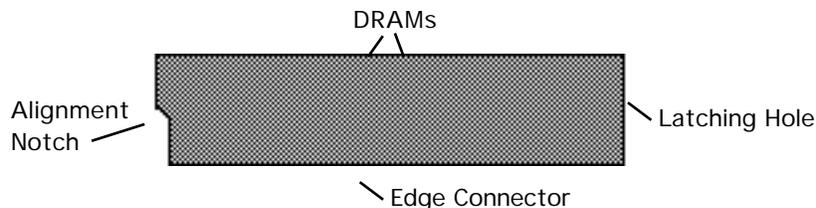
First, Sampled Sounds are volatile. This means that once loaded, the sounds will remain in the TS-12 for as long as the TS-12 is turned on. Once the TS-12 is turned off, though, any Sampled Sounds will disappear, just as they would from an ASR-10, or any other sampler. Sampled Sounds can require a tremendous amount of memory. Your TS-12 is shipped with 2 Megabytes of memory, expandable to 8 Megabytes with industry-standard SIMMs — more memory than you'll find in many personal computers. Backing up this amount of memory when the TS-12 is turned off requires more power than the internal battery (which supplies power to backup the TS-12's sound programs) can supply.

Second, the parameters available for programming in the EPS/EPS-16 PLUS/ASR-10 are somewhat different than those in the TS-12. When a Sampled Sound is selected, pressing any of the buttons in the Programming section will display edit pages specific to Sampled Sounds.

Finally, loading and selecting Sampled Sounds differs somewhat from loading and selecting TS-12 sound programs.

What is a SIMM?

SIMM is an acronym which stands for Single In-line Memory Module. SIMMs have become the industry standard used by most computers (both IBM and Mac compatible) to expand the computer's memory. Because of this, SIMMs are readily available in most computer software stores, and from mail order organizations. By having expansion SIMMs installed in the TS-12, you can load up to 20 EPS/EPS-16 PLUS/ASR-10 Sampled Sound files, with all settings intact.



Warning!

Because adding expansion SIMMs requires opening the TS-12 casing (which voids the ENSONIQ Warranty), SIMMs are not user-installable, and must be installed by an Authorized ENSONIQ Repair Station. To prevent damaging your TS-12, and/or causing bodily injury, do not attempt to install the SIMMs yourself.

Purchasing SIMMs

Since you will need to purchase your SIMMs before you bring them to an Authorized ENSONIQ Repair Station for installation, here is some important information you should know about purchasing the proper SIMMs:

- The TS-12 was designed to use either a pair of 1M x 8 (Macintosh) non-parity SIMMs or a pair of 4M x 8 (Macintosh) non-parity SIMMs (not 1M x 9 or 4M x 9 parity SIMMs). We highly recommend using this type of SIMMs.
- Use 30 pin (not 72 pin) SIMMs.
- We do not recommend using parity SIMMs (designed for IBM PC compatibles). These SIMMs may not operate properly, and may cause damage to the TS-12.

How Many SIMMs?

The TS-12 offers two options for SIMMs:

- The TS-12 is shipped from the factory with two 1x8 non-parity SIMMs — 1 BankSet (S8) is available (1 BankSet consists of 10 Sampled Sound Banks). The Sampled Sound BankSet will hold 1MWord of Sampled Sound information, equivalent to 4018 blocks of memory.
- With two 4x8 non-parity SIMMs installed — 2 BankSets (S8 and S9) of 10 Sampled Sound Banks each are available. Each Sampled Sound BankSet will hold 2MWords of Sampled Sound information, for a total of 4 MWords, offering 8114 blocks of memory for BankSet S8, and 8191 blocks for BankSet S9.

An Important Note About Electrostatic Discharge

SIMMs are susceptible to Electrostatic Discharge (ESD) commonly known as “static.”

Electrostatic Discharge can destroy or damage SIMMs. Here are some procedures you should follow when handling SIMMs in order to minimize the possibility of causing ESD damage:

- 1) Minimize the handling of SIMMs. Keep them in their static free packages until needed. Only transport or store SIMMs in their protective packages.
- 2) When handling SIMMs, avoid touching the connector pins. Try to handle the SIMMs by the edges only.

If you have any questions concerning the use of SIMMs, the TS-12, or for additional technical support, please contact ENSONIQ Customer Service at (215) 647-3930 Monday through Friday 9:30 a.m. to 12:15 p.m. and 1:15 p.m. to 6:30 p.m. Eastern Time.

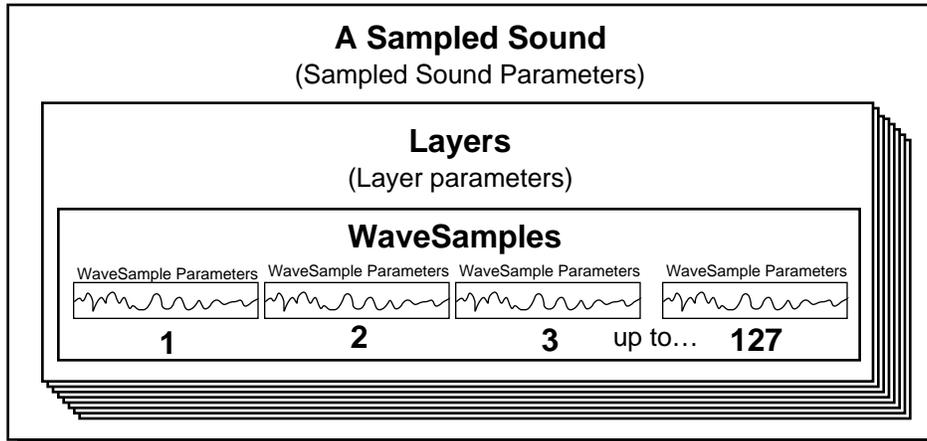
Sampled Sound Configuration

Each Sampled Sound consists of up to eight Layers, and up to 127 WaveSamples. Each WaveSample within a TS-12 Sampled Sound consists of the following:

- a digital oscillator playing a wave from memory
- two multi-mode digital filters
- one LFO (Low Frequency Oscillator)
- one random NOISE generator
- three complex envelope generators for controlling pitch, filter, and volume
- a versatile matrix modulation scheme with 15 routable modulation sources

About WaveSamples

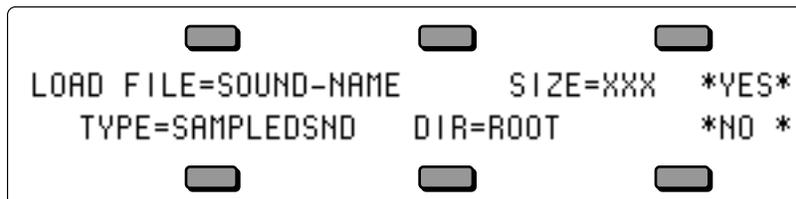
The WaveSample is the most basic unit of a Sampled Sound. A WaveSample can be anything — a drum, a mandolin trill, a sound effect, or your voice, for example. Each WaveSample has its own set of WaveSample parameter settings. Several WaveSamples can be grouped together to form *Layers*, and up to eight layers can reside within a Sampled Sound.



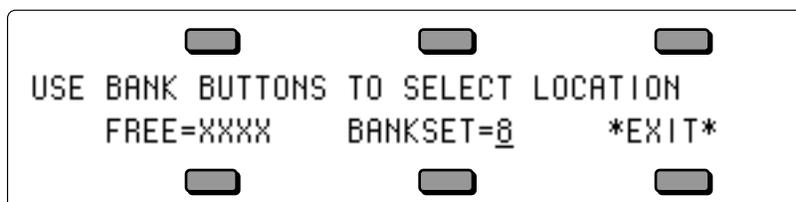
Loading a Sampled Sound

Because Sampled Sounds are stored in dynamic RAM, they are not saved internally, and must be loaded each time the TS-12 is powered on. To load a Sampled Sound:

- 1) Insert a disk containing a Sampled Sound into the TS-12 disk drive.
- 2) Press the **Storage** button.
- 3) Press the soft button above the word ***LOAD*** in the display. Note that the display will be slightly different than when loading normal sound programs:



- 4) Make sure the TYPE parameter is set to SAMPLEDSND (rather than DIRECTORY).
- 5) Select (underline) the LOAD FILE= parameter and use the **Up/Down Arrow** buttons or the **Data Entry Slider** to scroll through the listing of sounds available.
- 6) Once you've located a sound you'd like to load and hear, press the soft button above the word ***YES***. The display shows:



- 7) Here you can select which BankSet you want to load your Sampled Sound into (BankSet 9 is only available with expansion SIMMs installed) by using the data entry controls. The bottom left corner of the display shows the amount of free (unused) blocks available in DRAM for the

currently displayed BankSet. As it comes from the factory, the TS-12 has 4018 blocks of free DRAM memory. With expansion SIMMs installed, the TS-12 will offer 8114 blocks of DRAM memory in BankSet S8, and 8191 in BankSet S9.

- 8) Press any **Bank** button (0-9) to load the Sampled Sound into the TS-12.

About Directories

What is a Directory?

Files on Sampled Sound disks are organized in directories. A directory is a group of up to 38 files. These files can be one of two possible file types: a Sampled Sound or another directory (called a sub-directory). Each sub-directory may contain up to 38 more files. If there are no sub-directories, the disk will only contain the 38 files of the Root (or Main) directory. The Root directory is the default top level directory selected when you change SCSI DEVICE ID numbers on the SCSI STATUS page or after power-up. If you are familiar with the Macintosh computer, or MicroSoft Windows™ for IBM/PC Compatibles, sub-directories are similar to folders.

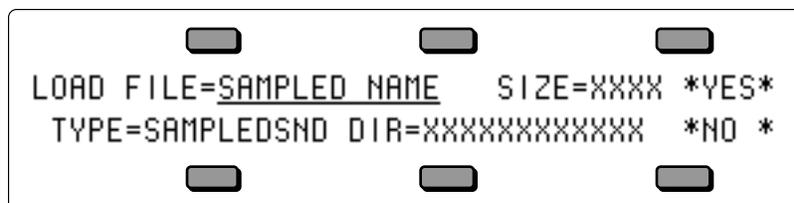
As explained above, the TS-12 will only allow you to scroll through a list of up to 38 files at any one time without changing directories. However, any one (or more) of these files may be a sub-directory, which may contain up to 38 more files. Eventually this becomes a tree-like structure with the root directory as the trunk, and the various levels of sub-directories conceptually similar to the branches of the tree.

For more information about SCSI and directories, refer to *Section 13 — Storage*.

Loading (Changing) a Directory

Sampled Sounds are most often saved in the ROOT (top level) directory on a floppy disk. However, there may be an instance where a Sampled Sound file is stored within a different directory. To load and/or change a Directory:

- 1) Insert a Sampled Sound disk containing a directory into the TS-12 disk drive.
- 2) Press the **Storage** button.
- 3) Press the soft button above the word *LOAD* in the display.
- 4) Select (underline) the TYPE parameter and use the Data Entry Controls to change the type to DIRECTORY.
- 5) Press the soft button above the LOAD FILE parameter to scroll through the listing of directories available.
- 6) Once you've located a directory you'd like to load, press the soft button above the word *YES*. The display shows:



The screenshot shows a monochrome display with two lines of text. The first line is "LOAD FILE=SAMPLED NAME SIZE=XXXX *YES*" and the second line is "TYPE=SAMPLEDSND DIR=XXXXXXXXXXXXX *NO *". There are three soft buttons (represented by small grey rectangles) above and below each line of text.

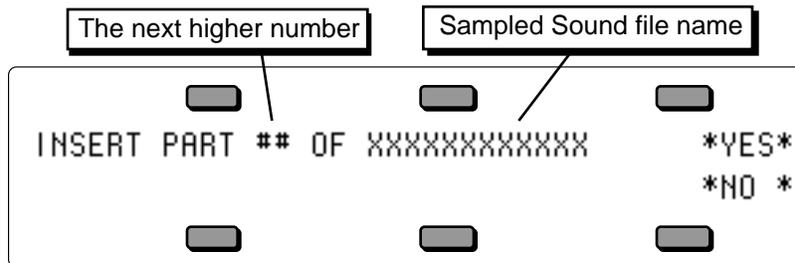
- 7) The bottom line of the display shows the newly loaded directory name. If there are any sub-directories within the currently loaded directory, you can set the TYPE parameter to DIRECTORY, select them using the LOAD FILE soft button, and load them as explained above. Any Sampled Sound within a directory can be loaded in the same manner as explained earlier.

Here you can select which BankSet you want to load your Sampled Sound into (BankSet 9 is only available with expansion SIMMs installed) by using the data entry controls. The bottom left corner of the display shows the amount of free (unused) blocks available in DRAM for the currently displayed BankSet. As it comes from the factory, the TS-12 has 4018 blocks of free DRAM memory. With expansion SIMMs installed, the TS-12 will offer 8114 blocks of DRAM memory in BankSet S8, and 8191 in BankSet S9.

8) Press any **Bank** button (0-9) to load the Sampled Sound into the TS-12.

Multi-Disk Sampled Sound Display Messages

Multi-disk Sampled Sounds are loaded the same way as single-disk Sampled Sounds, with the addition of a few extra display messages. Multi-disk EPS/EPS-16 PLUS/ASR-10 Sampled Sound files are indicated by a flashing number next to the file name on the LOAD FILE page. After loading part of a multi-disk Sampled Sound file, the display will read:

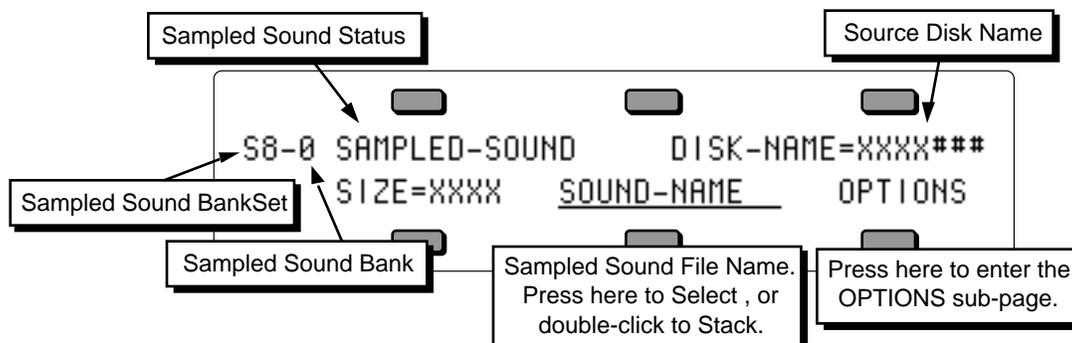


- If you answer YES to loading the next higher part number, with a disk containing the wrong part number in the drive, the display will show DISK CONTAINS WRONG PART. This message will last for a few seconds, and then return to the previous display.
- If you answer NO to loading the next higher part number, the display will momentarily show: MULTI-DISK LOAD NOT COMPLETED.
- If you try to load part 2 without loading part 1 first, the display will momentarily show: INVALID FILE LOAD PART 1 FIRST.

Selecting and Playing a Sampled Sound

Once the sound has finished loading, you will probably want to select it so you can play it:

- Press the **Sounds** button, press the **BankSet** button, and while holding it down, press the **Bank 8** button to select the Sampled Sound BankSet 8. You'll find the display looks a bit different than when you are selecting Programs:



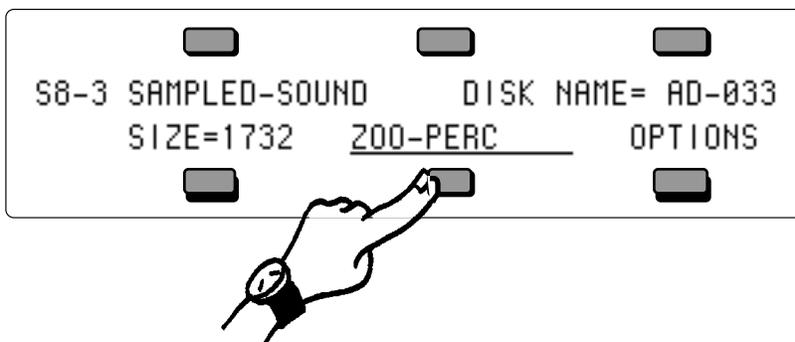
The top line of display shows the status of the Sampled Sound, and the name of the disk from which the Sampled Sound was loaded into the TS-12. The bottom of the display also shows the size of the Sampled Sound in blocks, the Sampled Sound name (or *EMPTY-BANK* for an empty Sampled Sound bank location), and OPTIONS that provides access to an Options sub-page.

When the Sampled Sound Status is showing:

- **SAMPLED-SOUND** — You will hear the Sampled Sound, because it has been loaded into memory, and is not muted.
- **SAMPLE-EDITS** — You will hear the Sampled Sound, because it has been loaded into memory, and is not muted. However, edits have been made to the Sampled Sound within the TS-12, and those edits were saved on a TS-12 formatted disk as a Sample Edits file. When the Sampled Sound Status shows **SAMPLE-EDITS**, the Source Disk Name will show the name of the TS-12 floppy disk on which the Sample Edits are stored.
- **UNSAVED-EDITS** — Appears after you have edited a Sampled Sound or Sampled-Edits file, but have not saved or resaved it as a **SAMPLE-EDITS** file to a TS-12 disk. Think of this as a reminder to save your edits.
- **---(MUTED)---** — You will not hear the Sampled Sound, because it has been loaded into memory, and then muted. You will hear the “Surrogate Program” in its place (described in *Section 14 — Understanding Sampled Sounds*).
- **---NOT LOADED---** — You will not hear the Sampled Sound because it has not been loaded into memory. You will hear the “Surrogate Program,” because the Sampled Sound is not loaded into the TS-12.

When the Sampled Sound Status shows **---(MUTED)---** or **---NOT LOADED---**, the name of the Sampled Sound on the bottom line will appear in parentheses. Any Preset or Seq/Song Tracks that the Sampled Sound Bank is assigned to will show ***BANK S#-#*** in place of the Sampled Sound name. This indicates the BankSet and Bank location of the Sampled Sound that was assigned to the Track.

Use the bottom center soft button to select (single press) or layer (rapidly double-click) the Sampled Sound. Sampled Sounds can be stacked and used in Presets and Sequences just as Programs can.



Unlike Programs, which are stored in battery backed-up memory, if you turn the TS-12 off and back on, any Sampled Sounds will disappear from memory and need to be re-loaded into the same locations in order for Sequences and Presets that use them to work correctly. The Sampled Sound Bank pages will retain the information about which Sampled Sounds or Sample Edits were loaded into each location. They can be manually reloaded one at a time, or reloaded automatically, using the Auto-Load feature. See the description of the Auto-Load feature later in this section for more information.

Sampled Sound OPTIONS page

The bottom right field on the Sampled Sound Bank pages provides access to certain options. Pressing the soft button beneath OPTIONS will reveal the following sub-page:

```
S8-0 SAMPLED-SOUND OPTIONS
      *DELETE*      *MUTE*      *EXIT*
```

On this sub-page you can delete, or mute/unmute the Sampled Sound. The bottom center of the display will either show *MUTE* or *UNMUTE*. The *MUTE* field will appear whenever a Sampled Sound is loaded and not muted. The *UNMUTE* field will appear whenever a Sampled Sound is muted. Pressing the bottom center soft button will switch between a muted and unmuted status and return you to the previous screen.

- Pressing the soft button beneath *MUTE* will mute the Sampled Sound, and you will hear the “Surrogate Program” in place of the Sampled Sound on any Preset or Seq/Song Track(s) that the Sampled Sound is assigned to.
- Pressing the soft button beneath *UNMUTE* will unmute the Sampled Sound, allowing you to hear the Sampled Sound, and it will play normally on any Preset or Seq/Song Track(s) that it is assigned to.
- Pressing *EXIT* will exit the Options sub-page, returning you to the Sampled Sound Bank page. The Sampled Sound Status will be unchanged.
- Pressing the soft button beneath *DELETE* will prompt you with the following message:

```
DELETE <Sampled Sound name>      *YES*
FROM SAMPLED-SOUND BANK S8-0     *NO *
```

The top line of the display will show the name of the Sampled Sound that will be deleted, and the bottom line will show the BankSet and Bank location. Pressing *YES* will delete the Sampled Sound from memory, making the location into an *EMPTY-BANK*. This is useful if you want to load in a large Sampled Sound to another bank and don't have enough memory, or if you want to save only certain Sampled Sound information with a SAMPLE-BANKS file (see later in this section). Pressing *NO* will abort the procedure and will display the Sampled Sound Bank page.

Tip: It is a good idea to delete unused Sampled Sounds so they will not be loaded or prompted for during the Auto-Load procedure.

Lack of Memory Message

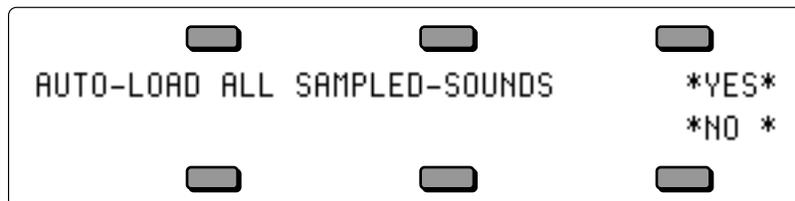
If you try loading a Sampled Sound, and do not have enough free memory available, the following display will appear:



At this point, you can select a Sampled Sound Bank location to delete (by pressing the appropriate **Bank** button), or press the soft button beneath ***EXIT*** to abort the **LOAD FILE** procedure. The shortage field in the display will show how many additional blocks of memory are needed to load in the Sampled Sound file. If the Sampled Sound Bank that you select to delete is smaller than the shortage amount, that Bank will be deleted, and the shortage amount will be adjusted, showing how many blocks are still needed to load the Sampled Sound file.

About the Auto-Load Feature

If you have loaded any Sampled Sounds or Sample Edits into the TS-12 and then powered down, the TS-12 remembers the name, source disk(s), file path, and Sampled Sound bank location for each of the Sampled Sounds. The Auto-Load feature allows you to automatically load Sampled Sounds back into the same Bank location(s). The Auto-Load feature loads Sampled Sounds into the TS-12 from left to right, and then loads any Sample-Edits last. When you turn the TS-12 on, the display shows the following prompt:



The Auto-Load prompt will also appear after you manually load a **SAMPLE-BANKS** file, or load a **60-SEQ/SONGS** file that was saved with Sample Banks (flashing **S** or **PS** on the **LOAD FILE** page).

Note: If you do not want to see this prompt, use the **Erase All Sampled Sounds Data** command described later in this section.

Note: Any edits made to a Sampled Sound that have not been saved as a Sample Edits file, will *not* be restored with the Auto-Load feature.

If you answer ***NO *** to the Auto-Load prompt, the TS-12 will display the last Sounds or Preset Bank page, and no Sampled Sounds will be automatically loaded.

If you answer ***YES***, the display will momentarily show:



WORKING... is displayed when the TS-12 is preparing to load Sampled Sound files, and is

identifying the data on the current floppy disk in the disk drive and any connected SCSI storage devices. WORKING... will also be displayed while a removable SCSI storage device is spinning up to speed (see later in this section for information on the SCSI option).

Once the TS-12 is finished WORKING..., it will automatically load any needed files from the current disk in the disk drive, and from any connected SCSI Storage Devices.

If the TS-12 cannot find a file it needs to load on either the current disk in the disk drive, or from any connected SCSI Storage Device, the display will show one of four different prompts:

- 1) If a Sampled Sound originated from a floppy disk that has a disk name, the display shows:



The display asks you to insert the disk with the defined disk name into the disk drive. Insert the requested disk into the disk drive, and press the soft button above *OK*. The TS-12 will automatically load any needed Sampled Sound files from the disk. If you do not want to load the Sampled Sound from the requested floppy disk, or if you do not have the disk, press the soft button beneath *SKIP*, and the TS-12 will request the next disk that it needs to load from.

Note: If you intend to skip all of the Sampled Sound files, you may need to press *SKIP* up to 20 times.

- 2) If the Sampled Sound originated from a floppy disk that does not have a disk name, the display shows:

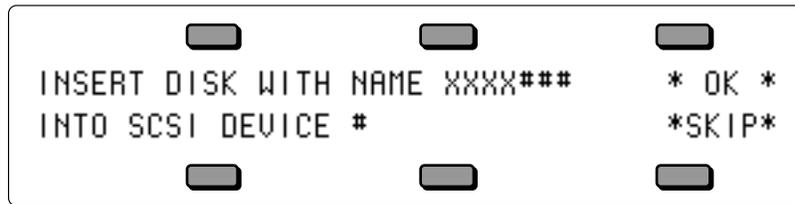
```

PUT DISK WITH FILE XXXXXXXXXXXX * OK *
INTO DISK DRIVE                  *SKIP*
  
```

Because the disk has no disk name, the display asks you to insert the disk with the defined Sampled Sound file name into the disk drive. Insert the requested disk into the disk drive, and press the soft button above *OK*. The TS-12 will automatically load the requested Sampled Sound file from the disk. If you do not want to load the requested Sampled Sound file, press the soft button beneath *SKIP*, and the TS-12 will request the next disk that it needs to load from.

Note: If you own or have access to an ENSONIQ ASR-10 or an EPS-16 PLUS, we recommend that you add unique disk names to unlabeled disks using the Command/System•MIDI, WRITE DISK LABEL Command to improve the functionality of the Auto-Load feature. This should be done *before* the Sampled Sounds are loaded into the TS-12.

- 3) If the Sampled Sound originated from a SCSI volume that has a disk name, the display shows:



The display asks you to insert the disk (CD ROM, removable cartridge, or other removable media) with the defined name into the selected SCSI Storage Device, or verify that the requested drive is connected.

Warning!

If the requested drive is *not* connected, be sure to power down both the TS-12 and the SCSI Storage Device *before* making any connections between the units.

Note that the SCSI Device ID number for the requested SCSI volume must be set to the same value as shown in the display. Insert the requested disk into the SCSI Storage Device, and press the soft button above *OK*. The TS-12 will automatically load any needed Sampled Sound files from the disk. If you do not want to load the Sampled Sound from the requested disk, press the soft button beneath *SKIP*, and the TS-12 will request the next disk that it needs to load from.

- 4) If the Sampled Sound originated from a SCSI volume that does not have a disk name, the display shows:



Because the SCSI volume has no disk name, the display asks you to insert the disk (CD ROM, removable cartridge, or other removable media) with the defined Sampled Sound file name into the selected SCSI Storage Device or to verify that the requested drive is connected. Note that the SCSI Device ID number for the requested SCSI volume must be set to the same value as shown in the display. Insert the requested disk into the SCSI Storage Device, and press the soft button above *OK*. The TS-12 will automatically load the requested Sampled Sound file from the disk. If you do not want to load the requested Sampled Sound file, press the soft button beneath *SKIP*, and the TS-12 will request the next disk that it needs to load from.

Insert the requested disk into the disk drive (or SCSI Storage Device) and press the soft button above * OK * to automatically load the Sampled Sound files. If the Sampled Sound files needed are from several disks, the display will show each disk label name, allowing you the opportunity to load the file, or *SKIP* that particular file.

Warning!

Because the TS-12 can automatically load Sampled Sounds that were previously loaded from a connected SCSI Storage Device, we recommend powering on the SCSI Storage Device(s) first before powering on the TS-12.

Note: The TS-12 remembers Sampled Sound files not only by the disk name and file path, but also by the SCSI Device ID number. If you originally loaded a Sampled Sound file from a CD ROM Drive assigned to SCSI Device ID #4, and then changed its ID number, the TS-12 will not be able

to find the Sampled Sound to load it. Make sure you leave each SCSI Storage Device set to the same Device ID number as when the Sampled Sounds were first loaded from it.

Note: When you power down, the TS-12 remembers the information about which Sampled Sounds or Sample Edits were loaded into each Sample Sound bank location (whether muted or unmuted). If you do not want to reload certain Sampled Sound files when you power up, use the DELETE option found on the Sampled Sound OPTIONS sub-page to delete any unwanted Sampled Sounds *before you power down*.

Loading Sample-Edits with the Auto-Load Feature

If any Sample Edits files have been loaded into the TS-12, or have been saved to a TS-12 disk and are still loaded, they will also be reloaded by the Auto-Load Feature. After you choose to Auto-Load all Sampled Sound files:

- The TS-12 will ask for the disk that contains the Sampled Sound data used by the Sample Edits file. Insert the requested disk into the disk drive (or connected SCSI Storage Device) and press the soft button above * OK * to automatically load the Sampled Sound file. The display will momentarily show:



The display will then ask for the TS-12 formatted disk that has the Sample-Edits file:

- Insert the requested disk into the disk drive and press the soft button above * OK * to automatically load the Sample Edits file, and apply the edits to the Sampled Sound Wave data.

When Does Auto-Load Delete All Sampled Sounds?

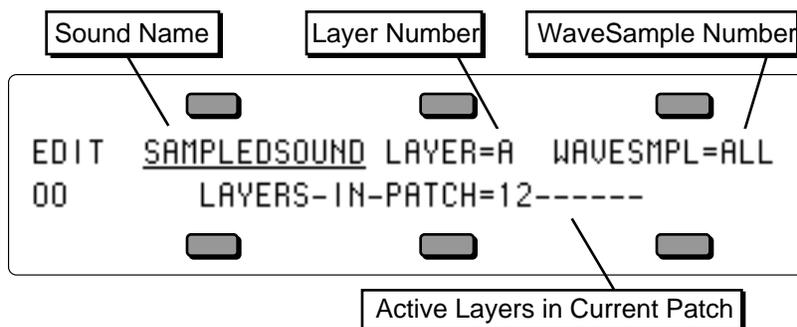
When you load a SAMPLE-BANKS file or a 60-SEQ/SONGS file that was saved with Sample Banks into the TS-12, and then answer *YES* to the AUTO LOAD ALL SAMPLED SOUNDS prompt, it deletes all currently loaded Sampled Sounds and Sample Edits in the TS-12, with the following exceptions:

- If the same Sampled Sound is being loaded into the same BankSet and Bank location, the old data is kept and the load is skipped.
- If the same Sampled Sound is being loaded into the same BankSet, but into a different Bank location, it will be moved to the correct location.
- If the same Sampled Sound is being loaded into the same BankSet, but into a different Bank location, and has had any parameter and/or effect edits made to it, but was not saved as a Sample-Edits file, the Sampled Sound will be moved, and the parameter edits will be moved, but the edited effects settings will be discarded. The original Sampled Sound effects settings will be reinstalled into the new location.
- If the same Sample-Edits file is being loaded into the same BankSet, but into a different Bank location, it will also be moved. If there were parameter and/or effect edits that were not resaved to the Sample-Edits file, the edited parameter and effect settings will be moved to the new location.

Selecting a WaveSample or Layer for Editing — the Edit Context page (Select Voice button)

In the next two sections of the manual, all the tools available for editing a raw WaveSample will be covered. Almost all of the Sampled Sound parameters will require you to select either a WaveSample or Layer for editing. The procedure for doing this is quite simple:

- Select the Sampled Sound that you want to edit (it should be underlined).
- Press the **Select Voice** button, which is the **Edit** button for Sampled Sounds. The TS-12 displays the Edit Context page:



You see the currently selected Sampled Sound, layer (stereo or mono), and WaveSample.

- Press the top right soft button to move the cursor (underline) beneath the WaveSample Number (WAVESMPL=ALL).
- Play the keyboard to select the WaveSample you want to work on. When you play the keyboard, the WaveSample Number showing on the display will change as you play different WaveSamples. Whichever WaveSample Number is showing is considered the current “edit WaveSample” — the one that will be affected by any WaveSample Edit functions.
- To perform editing on all WaveSamples in an entire layer, press the top middle soft button. The cursor should be beneath the Layer Number (LYR=). You can select the various layers within the Sampled Sound by using the Data Entry Controls. Only layers active in the current patch can be edited (active layers are displayed on the bottom of the display). If the layer number has an “L” or an “R” directly after it, then it is defined as a Left or Right stereo layer. Any edits to WaveSamples in a stereo layer will also affect the WaveSamples in its “companion” layer, even if the companion layer is not active in the current patch.
- To perform editing on all active layers and WaveSamples in a Sampled Sound, make sure the cursor is beneath the Name (by pressing its soft button). The Layer Number reads LYR=A, and the WaveSample Number reads WAVESMPL=ALL. Now any WaveSample parameter edits will affect all layers and WaveSamples in the current patch.
- When LYR=A or WS=ALL, the Data Entry Controls function as described below:

Note: When STEREO=ON on the Layer page (found by pressing the **Program Control** button), editing layer or WaveSample parameters in one layer will edit the same parameter in its companion layer. Editing with the **Data Entry Slider** will set the current parameter in both layers to the same absolute value. Editing with the **Up/Down Arrow** buttons will edit parameter values in both layers *relative* to one another.

Tip: When the cursor is beneath the Layer Number on the Edit Context page, selecting any WaveSample Edit page, and pressing different keys, will display the parameter values for the WaveSamples assigned to that key range in the selected layer.

Note: Always make sure the WaveSample you want to edit is selected on the Edit Context page.

Note: Wherever you see the notation ##, that symbol will represent the numeric value of a parameter whose setting or level is considered arbitrary to the subsequent discussion. For example, if LOOP-POSITION= ##, the ## represents the entire range of this parameter. You can use the **Data Entry Slider** or **Up/Down Arrow** buttons to explore the range of values.

Tip: When editing Sampled Sounds, alternate presses of the Edit (Select Voice) button will toggle between the last selected editing page or sub-page, and the Edit Context page.

LAYERS-IN-PATCH (Layer Enable/Disable)

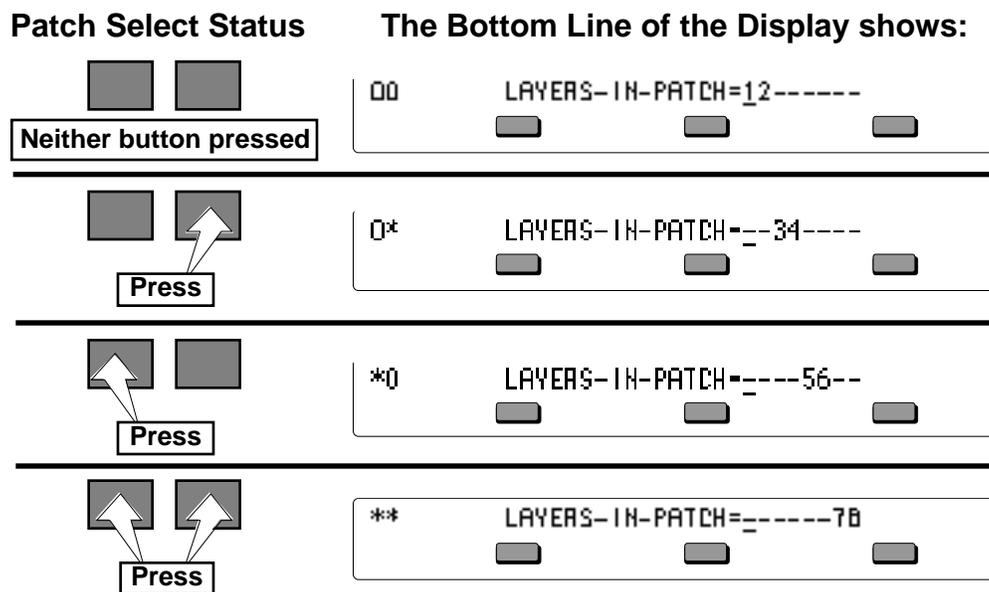
Using the Patch Select Buttons

The two patch select buttons above and to the left of the wheels can be programmed to provide instant access to up to four completely different sounds within each Sampled Sound. These variations might be a different set of samples, or the same samples with different envelopes, or a chorused version of the sound, or perhaps a different range of a wave sample.

What you are doing when you press either or both of the patch select buttons is selecting different layers to play. A layer is a group of WaveSamples spread across the keyboard — each Sampled Sound can have up to eight layers. For each of the four possible patches, any of these eight layers can be made to play or to remain silent.

- The patch select buttons are “momentary” — an alternate patch will play only on notes played while the button is held down unless you “lock in” a Patch.
- To “lock in” a particular patch so that it will play without having to hold any buttons: press the **Performance Options** button, and use the data entry controls to select the particular patch.
- To return to the default patch (neither patch button down) after you have “locked in” one of the other patches, press the **Performance Options** button again and set it to LIVE.

Here's how a typical Sampled Sound might react when you press the patch select buttons:



- A number means that a given layer is enabled, and will play in that patch;
- A dash means that the layer is disabled for that patch and will not play.

TS-12 Sampled Sound Messages

Sampled Sound messages are displayed for one second and indicate either successful completion or non-fatal error conditions encountered during a Sampled Sound operation:

- **SELECTED LAYER IS NOT IN PATCH** - indicates that you are attempting to edit a WaveSample in a layer that is not enabled in the current patch. See the above description of the **LAYERS-IN-PATCH** parameter for more information.
- **LAYER EDIT NOT ALLOWED** — certain parameters, like the Wave page parameters, can only be edited when the Edit Context page is set up to edit a single WaveSample (**WAVESAMPLE=###**). This message will be displayed if you try to edit those parameters with the Edit Context set up to edit an entire layer or an entire Sampled Sound. See the above description of the Edit Context page for more information.
- **NO STEREO COMPANION LAYER** — appears if you try to turn on the Layer page **STEREO** parameter when no companion layer exists. See the description of the **STEREO** parameter in the next section for more information.

Programming Patches

The **LAYERS-IN-PATCH** parameter allows you to program a layer—or combination of layers—to either play or not play depending on which patch select buttons are pressed.

To program patches:

- Select the Sampled Sound that you would like to program patches.
- Press the **Select Voice** button.
- With no patch select buttons pressed, use any of the bottom soft buttons to select the individual layers and the **Up/Down Arrow** buttons to enable and disable them. This will program the default patch (the one that will play with no patch select buttons pressed).
- Once the default patch is programmed, press the left patch select button. Notice that the left hand character in the display is now an asterisk, rather than a zero. This indicates the status of the particular patch select button.
- With the left patch select button held down, use the soft buttons to select the individual layers and the **Up/Down Arrows** to enable and disable them, as you did with the default patch.
- Repeat the procedure with the right hand patch select button held down, then with both patch select buttons held down.
- Remember to use the **SAMPLE-EDITS** save file type after you've made any changes.

The Patch Select buttons are transmitted and received over MIDI as MIDI controller #70.

What is a Surrogate Program

Because Sampled Sounds are stored in dynamic RAM (DRAM), which can only operate while power is on, they are not saved when the TS-12 power switch is turned off. If you should unexpectedly lose power, or have to power down for some unknown reason, you can define a substitute Program that will play on each Track that originally contained a Sampled Sound, until you can load the Sampled Sound back into the TS-12. This substitute Program is called a *Surrogate Program*. A Surrogate Program will also play whenever you mute a Sampled Sound (by pressing the soft button beneath ***MUTE*** on the Sampled Sound Bank **OPTIONS** sub-page).

All defined Preset or Sequence Tracks *always* have a Program assigned to them. When a Sampled Sound is put on a Track, it “covers up” the Program. When the power is turned off, the Sampled Sound (being in dynamic RAM) is gone. The next time you power on, you will hear the “uncovered” Surrogate Program until you reload the Sampled Sound.

Tip: To determine which Sampled Sound bank has been assigned to a track before power-off, press and hold either **Seq/Song Tracks** button, and while holding it down, press the **Sounds** button.

Assigning a Surrogate Program to a Track

A Surrogate Program can be assigned to each Sequencer and Presets Track that contains a Sampled Sound. To assign a Surrogate Program to a Sequence track:

- Load the Sampled Sound into the TS-12, and select it (underlined on the Sampled Sound Bank page).
- Press the **Seqs/Songs** button, select a -BLANK- location, and create a new sequence. Because the Sampled Sound was selected, it becomes the default sound assigned to Track 1.
- Record sequence Track data using the Sampled Sound. By having recorded data on the track, you will be able to hear the difference as you select an appropriate Surrogate Program.
- Make sure the Track on which the Sampled Sound resides is selected by pressing its soft button on the TRAX page (found by pressing the **Seq/Song Tracks 1-6** or **7-12** buttons).
- Press **Replace Track Sound** once (its LED is solidly lit), and the Sounds LED will be flashing.
- At this point, you can shop around using the **BankSet**, **Bank** and soft buttons to find an appropriate Program to use as the Surrogate Program for your Sampled Sound.
- When you've found the Program that you want to assign as the Surrogate Program, press **Replace Track Sound** again. This sends you back to the TRAX page showing that the Sampled Sound Track has been "replaced" by the Surrogate Program. You have just defined the Surrogate Program.

To reassign the Sampled Sound back to the Track:

- Press **Replace Track Sound** once. Its LED should be solidly lit, and the Sounds LED will be flashing.
- Use the **BankSet**, **Bank** and **soft** buttons to find and select the original Sampled Sound.
- After you've selected the original Sampled Sound, press **Replace Track Sound** again. The TRAX page will be displayed, and you can see that the Sampled Sound now resides on the Track. You have just assigned a Sampled Sound to a Track and defined its Surrogate Program.

Tip: There is a quick way to audition the Surrogate Program in a sequence or song:

- Press the **Sounds** button and go to the Sampled Sound Bank page.
- Press **OPTIONS**, then the ***MUTE*** button on the bottom of the options sub-page. Notice that the Sampled Sound name is now in brackets (parentheses).
- Press the **Play** button. The Track Sound you will hear is the Surrogate Program.

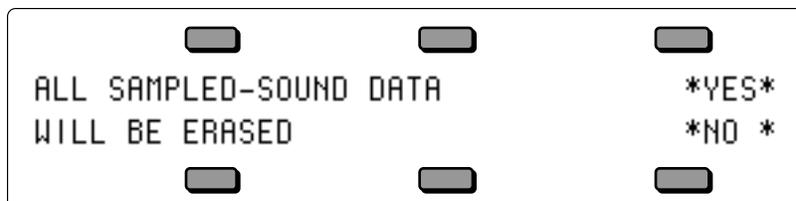
Erasing All Sampled Sound Data From Memory

If you want to clear the Sampled Sound memory, and start out with a "blank canvas", you can easily delete all of the loaded Sampled Sound and Sample-Edits from the TS-12 all at one time. This function will also delete the information about which Sampled Sounds had previously been loaded into Sampled Sound Banks.

Note: This can also be used to prevent the Auto-Load prompt from being displayed on power-on.

Here's how:

- While holding down the **Presets** button, press the bottom center soft button in the display. The display will show:



- Pressing the soft button above ***YES*** will erase all Sampled Sound data. Pressing the soft button beneath ***NO *** will abort the procedure, and any loaded Sampled Sound and Sample-Edits will remain in the TS-12.

Saving Sampled Sound Information

Although you cannot save Sampled Sound wave data from the TS-12, there are two options for saving Sampled Sound information on the Storage page. To access these:

- Press **Storage** to go to the Storage page.
- Press **DISK**. The Disk Storage menu appears.
- Press **SAVE**. The Save File display appears as shown above. The file type is underlined.

The two file types available for saving Sampled Sound information are:

- **SAMPLE-BANKS** — This file type will remember the name, source disk and file path, and the location of each Sampled Sound currently loaded in the TS-12. This can be useful in remembering which Bank locations certain Sampled Sounds are loaded into. This file type will also offer you the option to Auto-Load all Sampled Sounds (and Sample-Edits) that make up the SAMPLE-BANKS file.
- **SAMPLE-EDITS** — This file type will save all of the edited parameter information, as well as the effect for the Sampled Sound. This file type does not store the wave data for the Sampled Sound. The wave data must be loaded from the original EPS/EPS-16 PLUS/ASR-10 disk (or SCSI Storage Device, or CD-ROM with the optional SP-4 installed) after the SAMPLE-EDITS file has been loaded (explained later in this section).
- When you press ***YES*** for either file type, the display shows:

```

SAVE FILE      NAME=SAMPLE-BNKS      *YES*
                LEFT -CURSOR-  RIGHT      *NO *

```

- Name the file with a name of your choice using the data entry controls and the two cursor soft buttons, labeled **LEFT** and **RIGHT**.
- Press ***YES***. The display reads **SAVING <FILENAME>** while the data is being saved to disk. Or Press ***NO*** to cancel the procedure for any reason.
- If there is a file of that type with the same name already on the disk, the TS-12 will ask **DELETE OLD VERSION?** Press ***YES*** to save the file, replacing the one on the disk. This is for updating files to which you have made changes. Or press ***NO*** to abort the procedure.
- After the file is saved, the TS-12 returns to the Save File page so that you can save any other files you may want to save at that time.

What is a Sample-Banks File

A Sample-Banks file remembers up to 20 Sampled Sound names (ten in BankSet 8 and ten in BankSet 9, if applicable) as well as their source disk(s), file paths, and Bank locations. Loading a Sample-Banks file will allow you to Auto-Load the Sampled Sound files back into the same location(s) that they were in at the time the Sample-Banks file was saved.

Saving a Sample-Banks File

Because a Sample-Banks file remembers up to 20 Sampled Sound names, their source disk(s), file paths, and Bank locations, any Sampled Sounds Banks that you do not want to save as part of a Sample-Banks file must be deleted prior to saving the Sample-Banks file. This will prevent the AUTO-LOAD feature from requesting unwanted Sampled Sounds files.

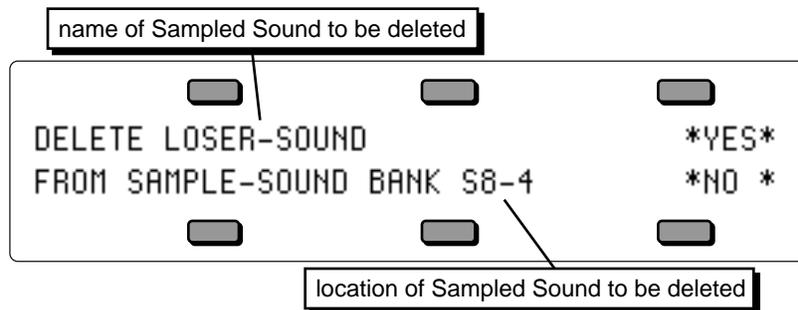
When you are ready to save a Sample-Banks file, first verify that there are no additional Sampled-Sounds loaded into the TS-12 that you do not want to save with the Sample-Banks file, and that there are no **-NOT LOADED-** Sample Sound Bank locations that you do not want reloaded.

Here's how:

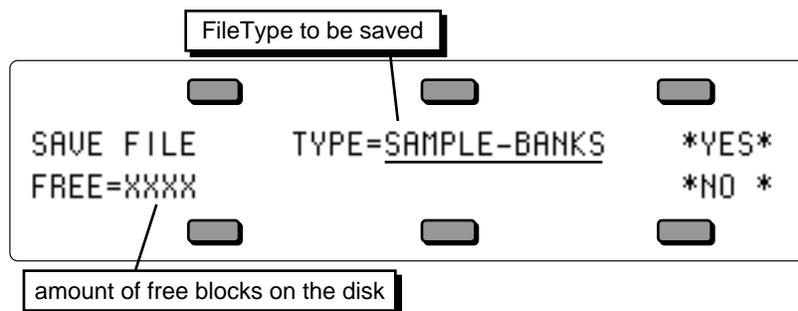
- Press **Sounds**.
- While holding down the **BankSet** button, press the **Bank 8** button. This displays Sampled Sound BankSet 8.
- Press each of the **Bank** buttons (0-9) and verify that for each Sampled Sound Bank, the bottom center of the display shows the name of a Sampled Sound that you want to save with the Sample-Banks file, or (*EMPTY-BANK*).

Note: If you have expansion SIMMs installed, after viewing BankSet 8, repeat the previous step for BankSet 9. To select BankSet 9, press the **BankSet** button once.

- If you should find a Sampled Sound either loaded (muted or unmuted) or -NOT LOADED- that you do not want to save with the Sample-Banks file, press the bottom right soft button beneath **OPTIONS**.
- Press the bottom left soft button to *DELETE* the Sampled Sound. The display shows:



- Press the soft button above *YES*.
- Repeat these steps for all Sampled Sound Banks that contain Sampled Sounds that you do not want to save with the Sample-Banks file.
- When you are sure that all Sampled Sounds that you do not want to save with the Sample-Banks file are deleted, insert a formatted TS-12 floppy disk into the disk drive.
- Press **Storage**.
- Press the bottom center soft button beneath **DISK**.
- Press the bottom left soft button beneath **SAVE**. The display shows the Save File page:

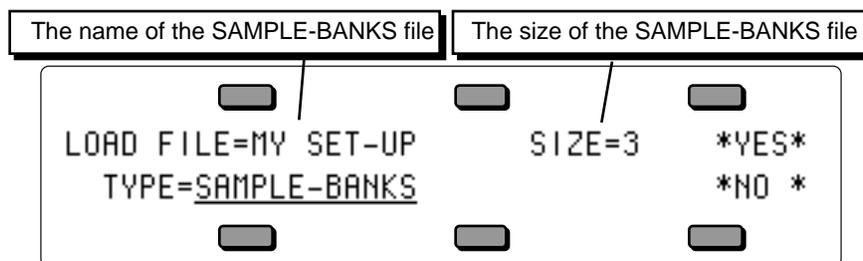


- Use the Data Entry Controls to select TYPE=SAMPLE-BANKS.
- Press the soft button above *YES*.
- At this point you can use the Data Entry Controls and the LEFT and RIGHT CURSOR controls to name the SAMPLE-BANKS file. When you've written a name for the file,
- Press the soft button above *YES*. The display momentarily shows SAVING <file name>, then DISK COMMAND COMPLETED, then reverts back to the SAVE FILE page.
- You have just successfully saved a Sample-Banks file.

Updating Sample-Banks Files Saved with Software Earlier than Version 2.0

If you have any Sample-Banks files that were created on the TS-10 or TS-12 using software earlier than version 2.0, they may not Auto-Load properly. Follow this procedure to update them for use with the version 2.0 Auto-Load feature:

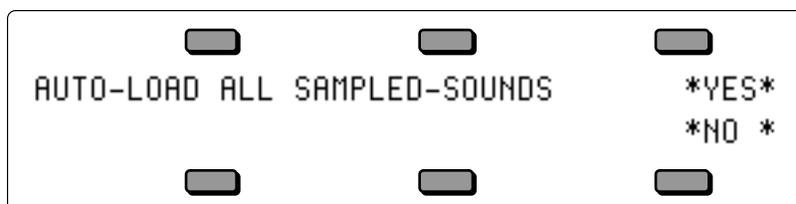
- Insert the floppy disk with the Sample-Banks file into the disk drive.
- Press **Storage**, then the soft button in the display beneath DISK, followed by the soft button beneath *LOAD*. The LOAD FILE page will be displayed.
- Use the Data Entry Controls to select TYPE=SAMPLE-BANKS . The display shows:



- Press the upper left soft button, and use the Data Entry Controls to locate your Sample-Banks file.
- Press the soft button above *YES* to load your Sample-Banks file. The display shows:



- Press the soft button above *YES* The display momentarily shows LOADING <Sample-Banks file name>, and then shows:



- Press the soft button beneath *NO*. The Sampled Sound Banks will now contain the names and types of the files to be reloaded, but not the Sampled Sound data.
- All Sampled Sound Bank locations that you do not want to save within the SAMPLE-BANKS file should be deleted from both BankSets S8 and S9, if applicable, using the *DELETE* Option found on the Sampled Sound Bank OPTIONS sub-page.
- All SAMPLE-EDIT files and their associated Sampled Sound files should be manually reloaded into their correct Bank locations.
- All SAMPLE-EDIT files should be manually resaved to a TS-12 disk.
- All Sampled Sounds should be manually reloaded into their correct Bank locations.
- The SAMPLE-BANKS file should then be resaved to a TS-12 disk in its updated form.

After performing this procedure, loading a Sample-Banks file and answering *YES* to the AUTO-LOAD prompt will properly load the Sampled Sounds and Sample Edits back into their original locations.

Loading a Sampled Sound into an Occupied Sampled Sound Bank

When loading a Sampled Sound, you can replace a currently loaded Sampled Sound with the one you want to load. For this example, we'll replace GUITR STRUMS with RS PERCS (both of these Sampled Sound files are found on the SSD-100 disk that came with your TS-12). Here's how:

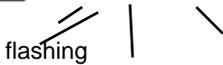
- Insert the SSD-100 disk into the disk drive.
- Press **Storage**, press **DISK**, then press ***LOAD***. The display shows:

```
LOAD FILE=VOCAL SNIPS    SIZE=420  *YES*  
TYPE=SAMPLEDSND DIR=ROOT      *NO *
```

- Press the upper left soft button in the display to select the file name (VOCAL SNIPS will be underlined).
- Press the **Up Arrow** button twice to select GUITR STRUMS.
- Press the ***YES*** button in the display to load the GUITR STRUMS file. The display shows:

```
USE BANK BUTTONS TO SELECT LOCATION  
FREE=XXXX  BANKSET=8  *EXIT*
```

```
S8-0 SAMPLED-SOUND    DISK NAME=SSD-100
      SIZE=1251    GUITR STRUMS    *DELETE*
```



The diagram shows a line connecting the underlined text 'GUITR STRUMS' to the word 'flashing' below it. Another line connects the text '*DELETE*' to the same word 'flashing' below it.

- To load RS PERCS into BankSet 8, Bank 0 (replacing GUITR STRUMS), while holding down the Bank 0 button, press the lower right soft button in the display beneath the word *DELETE*. The display momentarily shows LOADING RS PERCS, then reverts back to the LOAD FILE page. You have just successfully loaded a Sampled Sound file into an occupied Sampled Sound Bank.
- If you press a **Bank** button that does not have a Sampled Sound loaded (no LED lit), the TS-12 will immediately load the new Sampled Sound file.

Loading Sample-Edits

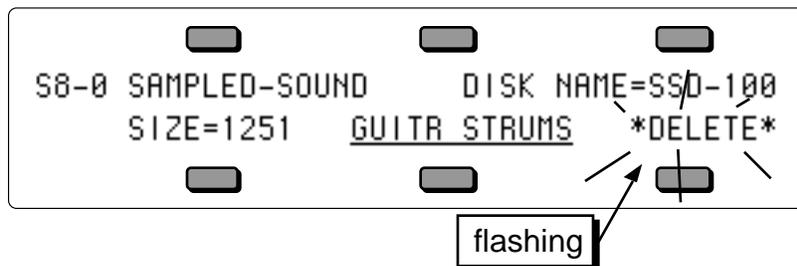
When loading a SAMPLE-EDITS file type, which contains edit parameter settings as well as the Sampled Sound effect, there are a few additional display requests. When a SAMPLE-EDITS file is loaded the following display appears:

Lack of Memory Message

If you try loading a Sampled Sound and do not have enough free memory available, the following display will appear:



At this point, you can select a loaded Sampled Sound Bank location to delete by pressing and holding the appropriate **Bank** button. The display will show the name of the Sampled Sound in that Bank location with the word ***DELETE*** flashing in the lower right corner of the display for as long as the **Bank** button is held down:



While holding down a **Bank** button, if you press the soft button beneath ***DELETE***, that Sampled Sound Bank will be deleted. If the Sampled Sound Bank that you select to delete is smaller than the **SHORTAGE** amount, the **SHORTAGE** amount will be adjusted, showing how many blocks are still needed to load the Sampled Sound file. You may continue to erase Sampled Sound Banks until there is enough free memory to load the Sampled Sound, at which point the file will automatically load. Press the soft button beneath ***EXIT*** to abort the **LOAD FILE** procedure.

Note that with expansion SIMMs installed (2x4 megabyte SIMMs), the two BankSets S8 and S9 are completely separate, and Sampled Sound memory blocks cannot overlap from one BankSet into the other. The **SHORTAGE** value indicates the memory shortage in the BankSet that was selected as the target for loading the Sampled Sound.

Modulators

About Modulation

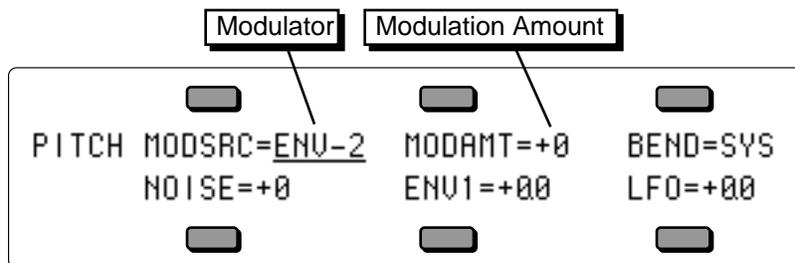
Various parameters within the voice architecture of Sampled Sounds can be modulated in the exact same way as Program Sounds. For a complete description of the TS-12 Modulation Sources, see *Section 8 — Understanding Programs*.

Selecting a Modulator

On programming pages where a modulator can be selected to modulate a given modulation destination, the display shows MODSRC=__ (short for Modulation Source). A modulator is chosen by selecting (underlining) the MODSRC= parameter with the soft buttons, and then using the **Data Entry Slider** or the **Up/Down Arrow** buttons to select among the 15 available modulation sources.

Tip: Moving the **Data Entry Slider** all the way up selects OFF, which is handy if you don't want a modulator applied to a particular destination.

Let's take, for example, the Pitch Mods page, which is where you apply modulation to the pitch of a WaveSample (i.e. Pitch is the modulation destination). Press **Pitch Mods**, then the soft button above MODSRC. The following display appears:



Modulation Amount

As shown above, where a modulation source is selected, the parameter immediately to its right controls the Modulation Amount which controls how deeply the selected modulator will affect the level to which it is being applied.

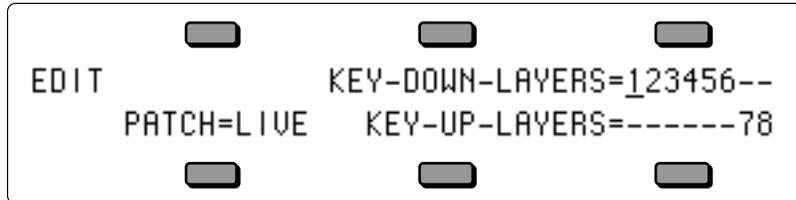
Press the **Right Arrow** button to underline the Modulation Amount, and use the data entry controls to adjust it. Modulation amount can be positive or negative. A modulation amount of +00 has the same effect as turning the modulator OFF.

Section 15 — Sampled Sound Parameters

This section offers detailed descriptions of the specific parameters used in editing Sampled Sounds. A Sampled Sound must be selected in Sounds mode in order for these parameter pages to be displayed. Most parameters are available on a per WaveSample basis, except for the parameters on the Layer page that apply to all WaveSamples in entire layers. For an overview of the concepts involved, refer to the previous section.

Edit KEY-DOWN/KEY-UP LAYERS Page (Copy button)

The parameters on this page control which layer(s) will be triggered when the keyboard is played. To access these parameters press **Copy**, which is the Sampled Sound **Edit KEY-DOWN/KEY-UP** button.



KEY-DOWN-LAYERS

Range: various combinations of layers

This parameter determines which layer(s) will be triggered when a key is pressed down.

- Select KEY-DOWN-LAYERS=#####. Successive presses of the soft button above KEY-DOWN-LAYERS will move the cursor through the numbers representing each layer. When the desired layer number is underlined, use the **Data Entry Slider** or **Up/Down Arrow** buttons to select either a number (layer enabled on keydown) or a dash (layer disabled on keydown) for each layer.

KEY-UP-LAYERS

Range: various combinations of layers

This parameter determines which layer(s) will be triggered when a key is released. A good example of this would be the “thunk” sound made by a harpsichord when you release a key. This release sound can be a separate sample placed in a layer designated as a keyup layer. If you want a layer to be triggered *only* when keys are released, first enable the layer on the KEY-UP-LAYERS parameter, and then disable the same layer on the KEY-DOWN-LAYERS parameter.

- Select KEY-UP-LAYERS=#####. Successive presses of the soft button beneath KEY-UP-LAYERS will move the cursor through the numbers representing each layer. When the desired layer number is underlined, use the **Data Entry Slider** or **Up/Down Arrow** buttons to select either a number (layer enabled on keyup) or a dash (layer disabled on keyup) for each layer.

PATCH

Range: LIVE, 00, -0*, -*0-, -**-, HELD

Selects the default patch select mode for the Sampled Sound. When set to LIVE, it uses the current state of the buttons to select a patch. When set to HELD, it uses the patch set by the first key hit while touching the patch select buttons. When set to any of the 4 patches (00, -0*, -*0-, -**), the Sampled Sound will ignore the patch selects and will always play the layers in the selected patch. For more information about patch selects, refer to Sections 4 and 5. This is the default setting that will be installed into a track when the Sampled Sound is selected.

TRK Defaults Page (Write Program button)

The parameters on this page are the default settings for the Track parameters that are stored with the Sampled Sound when it is saved as a SAMPLE-EDITS file. For more information about how these parameters function, see *Section 5 — Preset/Track Parameters*. To access these parameters press **Write Program**, which is the Sampled Sound **TRK** button.

The Sampled Sound TRK page contains copies of track parameters that are saved in the Sampled Sound. When a Sampled Sound is selected or put on a track, values of these parameters are installed in the track as the default initial settings. They can be edited on the track pages without affecting the Sampled Sound default settings, but must be edited on this page in order to be saved with the SAMPLE-EDITS feature. Changes made here will be copied to the current primary track.

**XPOS**

Range: -64 to +63

This parameter is the default transposition for the Sampled Sound. It is a transposition offset independent of the Track TRANSPOSE setting, and determines the pitch of the Sampled Sound when Track TRANSPOSE is set to +0 +00 (i.e.: nominal pitch). Editing this parameter will not edit the Track TRANSPOSE value.

BRIGHT

Range: -64 to +63

Editing the BRIGHT parameter default values will simultaneously edit the Track BRIGHTNESS parameter values on the track that the Sampled Sound is occupying. This is the default setting that will be installed into a track when the Sampled Sound is selected.

RATE

Range: -64 to +63

Editing the RATE parameter default values will simultaneously edit the Track RATE parameter values on the track that the Sampled Sound is occupying. This is the default setting that will be installed into a track when the Sampled Sound is selected.

RELS

Range: -64 to +63

Editing the RELS parameter default values will simultaneously edit the Track RELEASE parameter values on the track that the Sampled Sound is occupying. This parameter will affect the Time 5 value for Envelopes 1, 2 and 3. This is the default setting that will be installed into a track when the Sampled Sound is selected.

PRESS

Range: OFF, KEY, or CHAN

Allows you to select Poly-Key, Channel, or no pressure for the Sampled Sound. Generally, if a Sampled Sound doesn't need to respond to pressure, set this to OFF to conserve sequencer memory. This is the default setting that will be installed into a track when the Sampled Sound is selected.

XCTRL

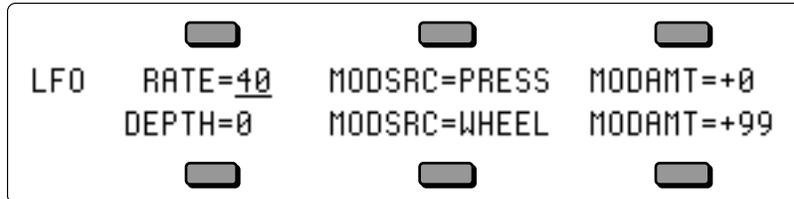
Range: 000 to 127

Editing the XCTRL parameter default values will simultaneously edit the Track XCTRL Parameter values on the track that the Sampled Sound is occupying. This parameter will only function if XCTRL has been assigned as a modulator within the selected Sampled Sound. This is the default setting that will be installed into a track when the Sampled Sound is selected.

LFO Page

The LFO Page contains the parameters related to the Low Frequency Oscillator. Each WaveSample has its own LFO, which can be assigned as a modulator wherever a modulation source is selected. LFO's are commonly used to create vibrato, tremolo, and other effects.

Press the LFO button. This takes you to the first sub-page of the LFO page:



RATE Range: 0 to 99

Determines the speed of the LFO. The table below shows the frequency (in hertz) for each value:

LFO FREQUENCIES

value	time (in Hz)								
0	.05	20	1.25	40	6.25	60	11.25	80	16.25
1	.05	21	1.50	41	6.50	61	11.50	81	16.50
2	.06	22	1.75	42	6.75	62	11.75	82	16.75
3	.06	23	2.00	43	7.00	63	12.00	83	17.00
4	.06	24	2.25	44	7.25	64	12.25	84	17.25
5	.07	25	2.50	45	7.50	65	12.50	85	17.50
6	.07	26	2.75	46	7.75	66	12.75	86	17.75
7	.08	27	3.00	47	8.00	67	13.00	87	18.00
8	.08	28	3.25	48	8.25	68	13.25	88	18.25
9	.09	29	3.50	49	8.50	69	13.50	89	18.50
10	.10	30	3.75	50	8.75	70	13.75	90	18.75
11	.11	31	4.00	51	9.00	71	14.00	91	19.00
12	.13	32	4.25	52	9.25	72	14.25	92	19.25
13	.14	33	4.50	53	9.50	73	14.50	93	19.50
14	.17	34	4.75	54	9.75	74	14.75	94	19.75
15	.20	35	5.00	55	10.00	75	15.00	95	20.00
16	.25	36	5.25	56	10.25	76	15.25	96	20.25
17	.33	37	5.50	57	10.50	77	15.50	97	20.50
18	.50	38	5.75	58	10.75	78	15.75	98	20.75
19	1.0	39	6.00	59	11.00	79	16.00	99	21.00

RATE MODSRC Range: various

Selects a modulation source for LFO RATE from among the 15 available modulators.

RATE MODAMT Range: 0 to 99

Determines the amount by which the assigned RATE modulator will affect the LFO RATE. The effect of RATE MODAMT is *added* to the effect of the LFO RATE parameter.

DEPTH Range: 0 to 99

Sets the “manual” level of the LFO. DEPTH controls the initial amount of LFO.

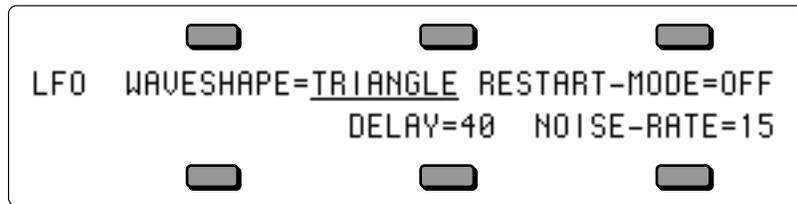
DEPTH MODSRC Range: various

Selects a modulation source for LFO DEPTH from among the 15 available modulators.

DEPTH MODAMT Range: 0 to 99

Determines the amount by which the assigned DEPTH modulator will affect the LFO DEPTH. The effect of DEPTH MODAMT is *added* to the effect of the LFO DEPTH parameter.

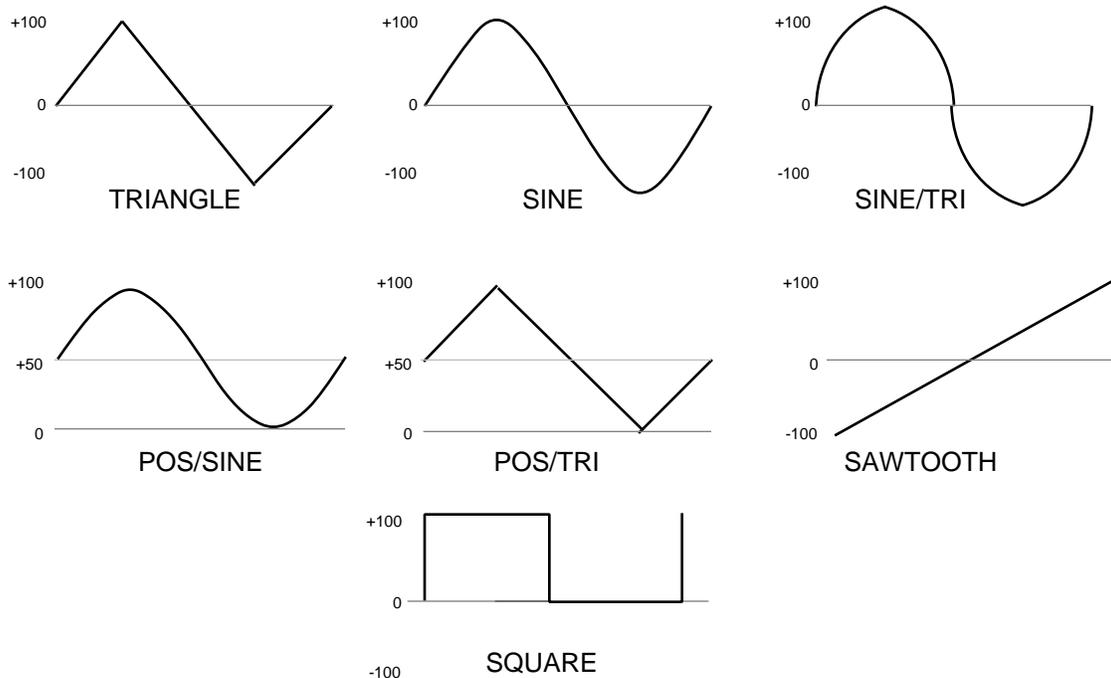
Press the LFO button again to access the second sub-page of the LFO page. The display reads:

**WAVESHAPE**

Range: various (see below)

Determines how the LFO signal will rise and fall. There are seven possible values:

- **TRIANGLE** — the triangle wave is commonly used to modulate pitch to produce vibrato.
- **SINE/TRI** — a mixture of a sine and triangle wave, a sort of pointy sine wave.
- **SINE** — the sine wave is a pure fundamental frequency, more rounded in its peaks and valleys than the triangle wave.
- **POS/TRI** — the POS/TRI is a positive-only triangle wave useful for simulating vibrato on sounds like the guitar, where vibrato techniques are limited to bending the note up.
- **POS/SINE** — the POS/SINE is a positive-only sine wave, similar in application to the POS/TRI.
- **SAWTOOTH** — the sawtooth wave is commonly used for special effects.
- **SQUARE** — this positive-only square wave is useful for producing in-tune trill effects.

LFO Waveshapes

RESTART-MODE Range: OFF or ON

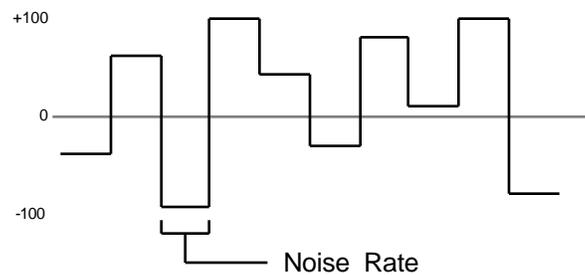
Determines whether the LFO will restart with each keystrike. When set to OFF, the LFO will cycle continuously without restarting. When set to ON, the LFO waveform will always start at the beginning of its cycle each time a new key is struck.

DELAY Range: 0 to 99

Determines the time it takes for the LFO to go from zero to the amount set with the DEPTH parameter. Values above 0 will cause the LFO to take longer to achieve its full depth. This is useful for creating delayed vibrato, tremolo, etc.

NOISE-RATE Range: 0 to 99

One of the TS-12's 15 available modulation sources is NOISE. The NOISE modulator produces a randomly changing level. Its main use is to randomize or "humanize" pitch when applied as a pitch modulator. It can also be used to randomize any other modulation destination. Typically, the NOISE signal might look like this:



NOISE-RATE determines how frequently the random level will change. Low values will cause it to change very slowly; with high values the level will change quickly.

WaveSample Envelopes

Each WaveSample has three envelopes associated with it. These envelopes are hard-wired to the pitch, filter cutoff frequency, and amplitude of the WaveSample. Env 1 and Env 2 can also be assigned elsewhere, wherever a modulator is selectable. Each of the three envelope buttons are directly above the page buttons for the function that they are hard-wired to:

- Env 1 is hard-wired to WaveSample pitch modulation.
- Env 2 is hard-wired to WaveSample filter cutoff frequency.
- Env 3 is hard-wired to WaveSample output volume.

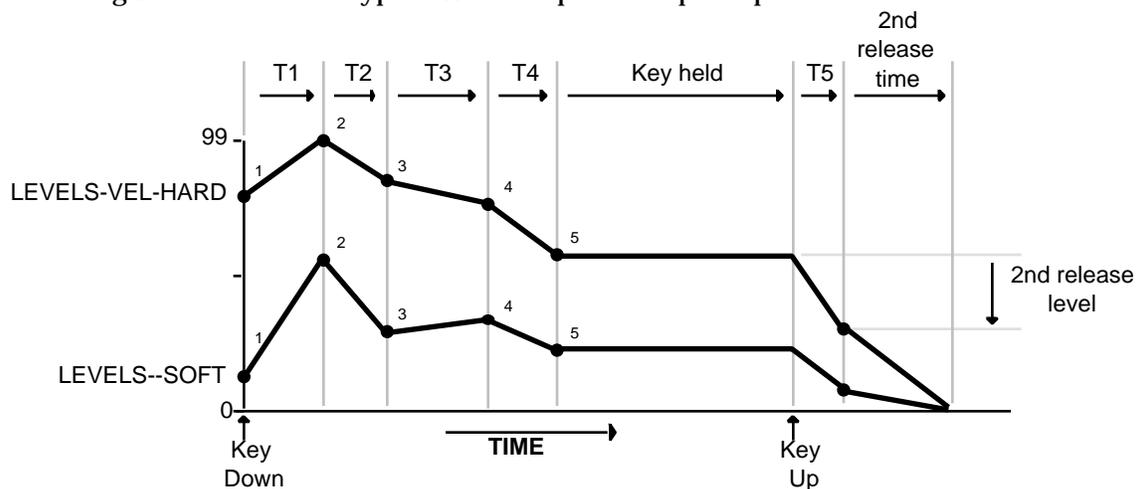
About ENV 3

The ENV3 LEVEL parameters and the WaveSample VOL parameter on the Output page both use the same (non linear) response curve. As shown below, setting any of these volume controls to 50 will attenuate a sound by 16 dB.

HARD OR SOFT LEVEL RESPONSE (dB)	LEVEL AMPLITUDE
99	0 dB
75	-8 dB
50	-16 dB
25	-32 dB
6	-56 dB
0	-∞ (infinity)

Typical WaveSample Envelope

The figure below shows a typical WaveSample envelope shape:

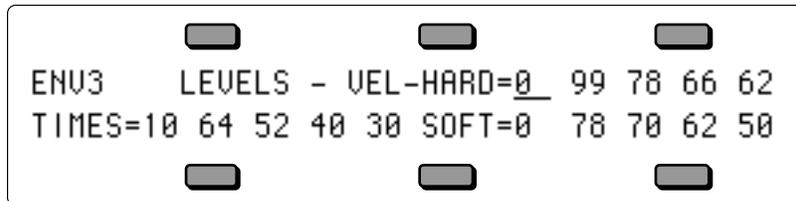


The WaveSample envelopes have six times and six levels. The envelope parameters allow you to describe two entirely different shapes; one for maximum velocity (VEL-HARD) and one for minimum velocity (SOFT). When a key is struck, the envelope generator *interpolates* between the two, creating a curve that is a combination of the two based on the incoming velocity.

ENV1, ENV2, ENV3 Pages

The ENV1, ENV2, and ENV3 Pages, parameters and ranges are all the same except where indicated below. We will use ENV3 as our example, since its effect on the volume of the WaveSample is immediately apparent.

Press the **Env 3** button. The display shows the first ENV3 sub-page.



LEVELS - VEL-HARD

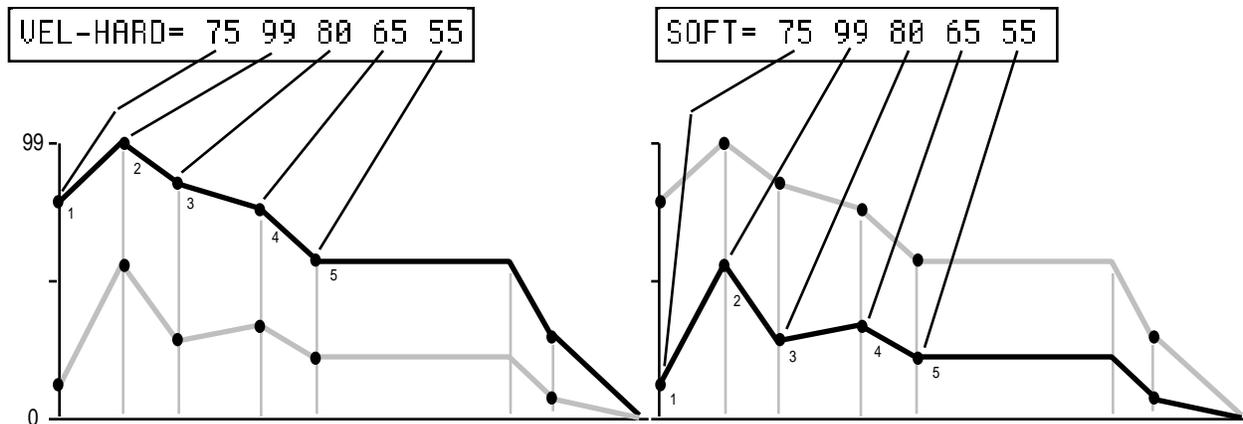
Ranges: 0 to 99

VEL-HARD shows the five levels for the envelope that will be used with maximum velocity. Level-1 is the initial level. In a traditional ADSR shape, Level-1 is always set to zero. Level-5 is the sustain level.

LEVELS - SOFT

Ranges: 0 to 99

SOFT shows the five levels for the envelope that will be used with minimum velocity.

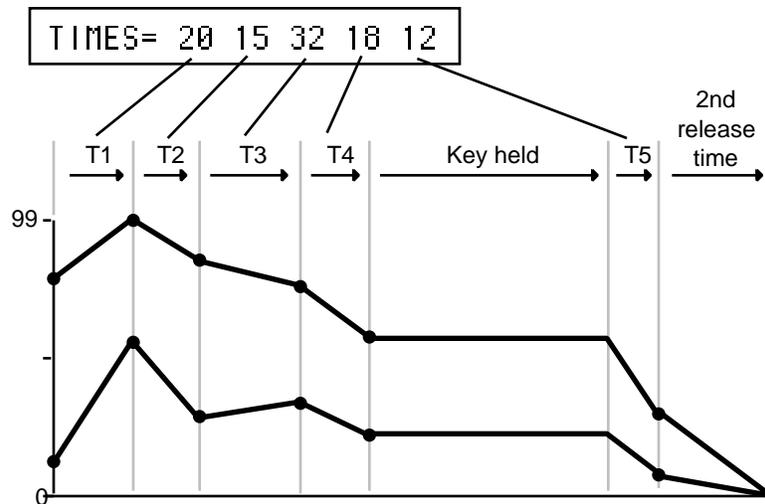


TIMES

Ranges: 0 to 99

TIMES shows five time parameters. The first four are the times between the five levels. The fifth time is the (first) release time.

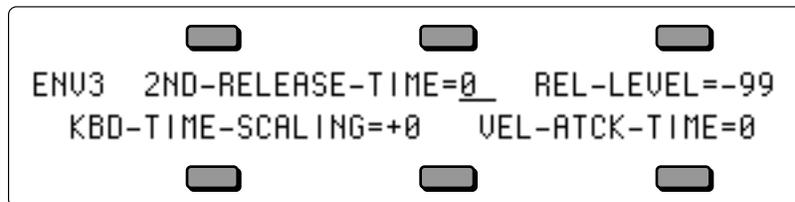
Note that the numbers shown here represent *times*, not rates. That is, the envelope will take a fixed amount of time to go from one level to another no matter how close together or far apart those two levels are.



ENVELOPE TIMES

	time value	(in sec)								
0	.00	20	.20	40	.82	60	3.2	80	13	
1	.01	21	.22	41	.88	61	3.5	81	14	
2	.02	22	.23	42	.94	62	3.7	82	15	
3	.03	23	.25	43	1.0	63	4.0	83	16	
4	.04	24	.27	44	1.0	64	4.3	84	17	
5	.06	25	.29	45	1.1	65	4.6	85	18	
6	.07	26	.31	46	1.2	66	4.9	86	19	
7	.08	27	.33	47	1.3	67	5.3	87	21	
8	.08	28	.35	48	1.4	68	5.7	88	22	
9	.09	29	.38	49	1.5	69	6.1	89	24	
10	.10	30	.41	50	1.6	70	6.5	90	26	
11	.11	31	.44	51	1.7	71	7.0	91	28	
12	.11	32	.47	52	1.8	72	7.5	92	30	
13	.12	33	.50	53	2.0	73	8.1	93	32	
14	.13	34	.54	54	2.1	74	8.6	94	34	
15	.14	35	.58	55	2.3	75	9.3	95	37	
16	.15	36	.62	56	2.4	76	9.9	96	39	
17	.16	37	.66	57	2.6	77	10	97	42	
18	.17	38	.71	58	2.8	78	11	98	45	
19	.19	39	.76	59	3.0	79	12	99	49	

Press the Env 3 button again. The display shows the second ENV3 sub-page.



2ND-RELEASE-TIME

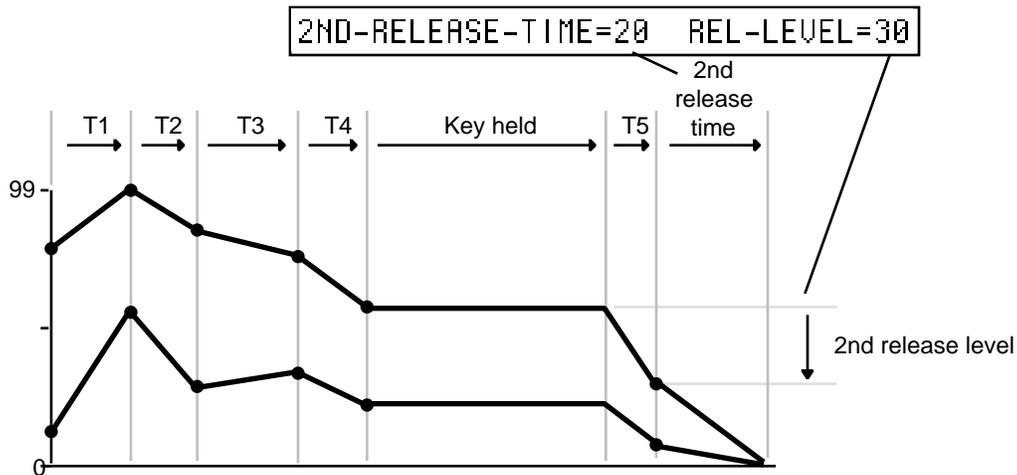
Range: 0 to 99

REL-LEVEL

Range: -99 to +99

2ND-RELEASE-TIME and REL-LEVEL provide one more breakpoint in the envelope that occurs after the release time (TIME-5). The LEVEL value controls where the breakpoint will be placed relative to the current output level of the envelope at the time the key was released.

The following diagram illustrates how the 2ND-RELEASE-TIME and REL-LEVEL interact with the VEL-HARD and SOFT levels of a typical envelope shape.



KBD-TIME-SCALING

Range: -99 to +99

KBD-TIME-SCALING makes the envelope times shorter or longer above and below the WaveSample root key depending on the key played. Positive values will make all envelope times shorter for keys above the root key, and longer for keys below the root key. Negative values will have the opposite effect. Envelope times for the WaveSample root key are not affected by this parameter. 2ND-RELEASE-TIME is also not affected by this parameter.

VEL-ATCK-TIME

Range: 0 to 99

This parameter makes envelope attack time (TIME-1) respond to velocity. Raising the VEL-ATCK-TIME value above zero makes TIME-1 shorter with harder keystrikes. If TIME-1 is set to zero this parameter will have no effect.

Press the Env 3 button again. The display shows the third ENV3 sub-page.



Envelope MODE

Range: NORMAL, FINISH, REPEAT

The MODE parameter has three states:

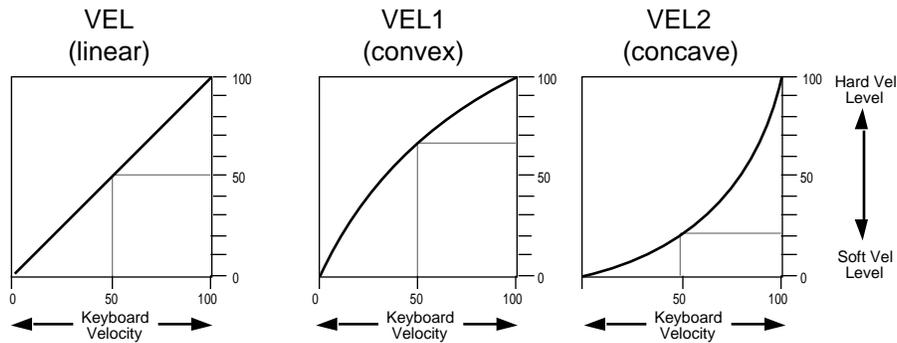
- **NORMAL:** The envelope will behave as pictured in the previous envelope diagrams.
- **FINISH:** The envelope will run through its full cycle, ignoring the key-up event. The envelope finishes what you set it up to do.
- **REPEAT:** The envelope will repeatedly cycle through LEVELS 2 through 5, using TIMES 1 through 4, for as long as the key is held down. When the envelope gets to LEVEL 5, it goes back to LEVEL 2.

SOFT-VEL-CURVE

Range: OFF, VEL, VEL1, VEL2

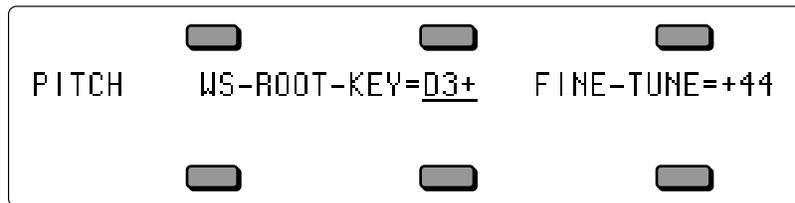
Determines how incoming velocity will affect the envelope's interpolation between the SOFT and VEL-HARD level settings. There are four settings:

- OFF — The envelope uses only the VEL-HARD levels, regardless of velocity.
- VEL, VEL1, or VEL2 — Incoming velocity will modulate the envelope levels between the SOFT and VEL-HARD level settings, according to one of the following velocity curves:

**Pitch Page**

The Pitch page parameters determine the playback pitch for each WaveSample.

Press the **Pitch** button. The display shows the PITCH page.

**WS-ROOT-KEY**

Range: K00 to K20, A0 to C8

This parameter allows you to change the WaveSample root key. The root key is the key at which the WaveSample plays back at the same pitch as it was recorded.

Note: Keys below A0 are displayed as K00 through K20. These values are only accessible when the Sampled Sound is transposed up.

FINE-TUNE

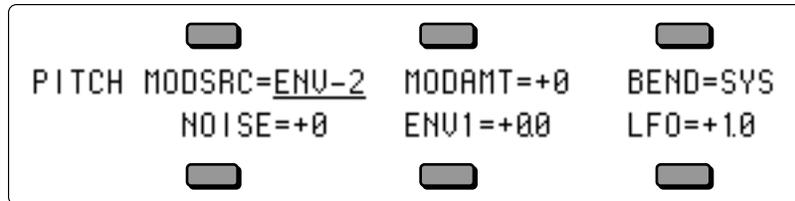
Range: -99 to +99 cents

This parameter adjusts the WaveSample fine-tuning.

Pitch Mods Page

The Pitch Mods page parameters control WaveSample pitch modulation.

Press the **Pitch Mods** button. The display shows the Pitch Mods page.



Note: When STEREO=ON, all pitch modulation in the right layer will be slaved to the settings in the WaveSamples assigned to the same or overlapping key zones in the left layer. This includes BEND Range, NOISE RATE, and all pitch modulation. Pitch modulation settings for WaveSamples in the right layer will be ignored.

MODSRC Range: various
Selects a modulation source for the pitch of the WaveSample from among the 15 available modulators.

MODAMT Range: -99 to +99
Determines the amount by which the assigned pitch modulator will affect pitch.

BEND Range: 0 to 12 semitones or SYS
Determines whether each WaveSample will have its own independent pitch bend range, or whether it will use the system pitch bend range to determine the maximum pitch change that can be applied by the pitch bend wheel. When BEND=SYS, the WaveSample will use the system pitch bend range setting. See the description of the PITCH-BEND parameter on the System Page in *Section 2 — System Page Parameters* for more information on the system pitch bend range.

NOISE Range: -99 to +99
This parameter controls the amount by which the NOISE modulator will affect pitch.

ENV1 Range: -15.7 to +15.7 semitones
This parameter controls the amount by which ENV1 will affect pitch.

LFO Range: -15.7 to +15.7 semitones
Determines the amount by which the LFO (Low Frequency Oscillator) will affect pitch.

TS-12 Filters

Each TS-12 WaveSample has its own pair of digital filters, F1 and F2, that are connected in series. The filter settings determine which frequencies will be allowed to pass through to the output.

Low-Pass and High-Pass

A low-pass filter allows only those frequencies below the filter cutoff frequency to pass—higher frequencies are filtered out. The reverse is true for the high-pass filters. In the TS-12, the first filter (F1) is always a low-pass filter. The second filter (F2) can be either a high-pass or low-pass filter.

Poles — Rolloff Curves

“Pole” is an engineering term that describes the steepness of a filter. Each additional pole gives a filter a steeper rolloff curve. In the TS-12, four poles are available, but they are divided between two filters; either as 2 and 2, or as 3 and 1. A single-pole filter will rolloff at 6 dB per octave; a 2-pole, 12 dB per octave; a 3-pole, 18 dB per octave; and 4-pole, 24 dB per octave. To reproduce a 4-pole low-pass filter (for that “classic” analog synth sound) you would set both filters to 2-pole low-pass. Each filter would then roll-off at 12 dB per octave, resulting in a total 24 dB per octave rolloff.

Cutoff Frequency

Every filter has a “knee” in the response curve, known as the cutoff frequency. This is the frequency at which the filter begins filtering out frequencies. The filter cutoff frequency can remain fixed over time, or it can be varied by modulating the filter with an envelope, LFO, velocity, etc. You can create some very interesting filter configurations by using a different modulator for each filter. For instance, try using pressure to modulate the filter. You can drive one filter up with pressure, while simultaneously driving the other down.

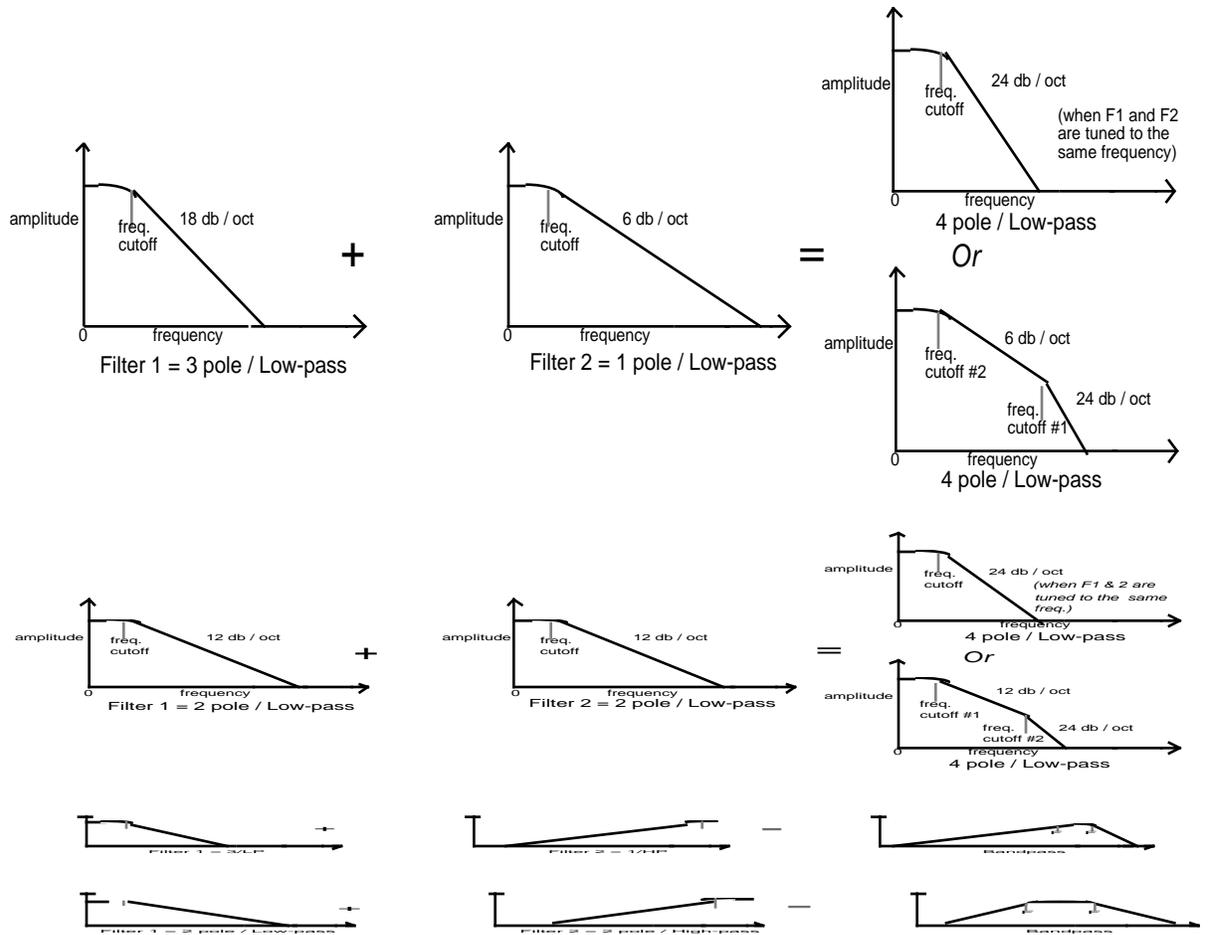
Edit/Filters Page

Use the parameters on this page to adjust the filters.

MODE (Filter Mode)

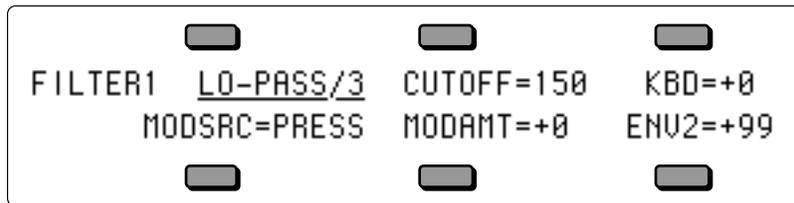
Use this parameter to choose one of the four filter modes.

The following diagrams show some possible filter configurations. On the left are the response curves of the two filters shown separately. On the right are some possible shapes of the combined filters.



FILTER 1 Page

Press the **Filters** button. The display shows the FILTER1 page.

**FILTER1 Mode**

Range: LO-PASS/2 or LO-PASS/3

Determines whether Filter 1 will be a 2-pole or a 3-pole low-pass filter.

CUTOFF

Range: 0 to 150

Determines the initial filter cutoff frequency for each of the two filters. With a low-pass filter, a setting of 150 lets all the original signal pass through the filter. With a high-pass filter, a setting of 0 lets through all of the original signal. This setting represents the “filter floor,” or manual level. The effect of any selected modulators will be added to (or subtracted from) this level.

KBD

Range: -99 to +99

Sets the amount by which the location of a note on the keyboard will modulate the filter cutoff frequency (filter keyboard tracking). To have the filter track the keyboard exactly set KBD=+50.

MODSRC

Range: various

Selects a modulation source for the filter cutoff frequency from among the 15 available modulators.

MODAMT

Range: -99 to +99

Determines the amount by which the assigned filter modulator will affect the filter cutoff frequency.

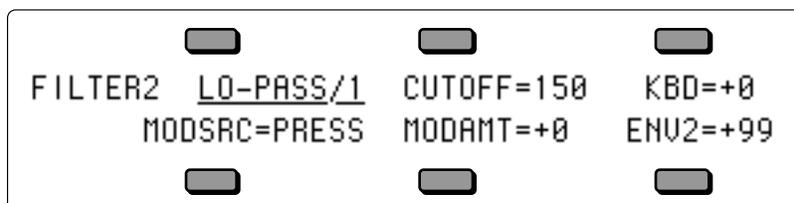
ENV2

Range: -99 to +99

Determines the amount by which Envelope 2 will affect the filter cutoff frequency.

FILTER 2 Page

Press the **Filters** button again. The display shows the FILTER2 page:

**FILTER2 Mode**

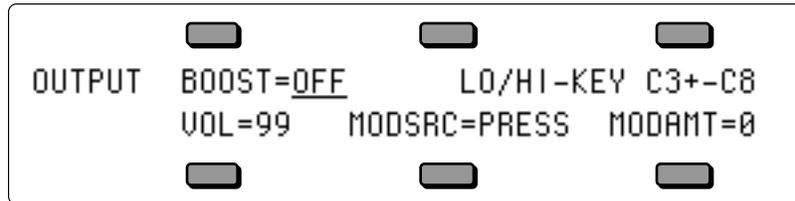
Range: HI-PASS/2, 1 or LO-PASS/2, 1

FILTER 2 can be configured as a 2-pole or 1-pole high-pass filter, or a 2-pole or 1-pole low-pass filter.

The remaining parameters and ranges are the same as for FILTER1.

Output Page

The parameters on this page control the amplitude (or volume) of the WaveSample.



BOOST Range: OFF or ON

Setting this parameter to ON gives the selected WaveSample a +12dB boost in volume. Be careful that adding boost to a sample doesn't cause it to become so loud that it starts to clip.

LO/HI-KEY Range: K00 to K20, A0 to C8

This parameter determines the key range the selected WaveSample will cover. Select the WS RNG LO parameter, play the key that you want to be the low key, the cursor will then automatically switch to the HI parameter, which can then be set in the same fashion.

Note: Keys below A0 are displayed as K00 through K20. These values are only accessible when the Sampled Sound is transposed up.

Note: If you accidentally set the High Key *below* the Low Key, the selected WaveSample will not be heard.

VOL Range: 0 to 99

Determines the volume of each WaveSample. Since Envelope 3 is permanently routed to control the volume of the WaveSample, this parameter also determines the amount by which ENV3 will affect volume.

MODSRC Range: various

Selects a modulation source for the output volume of the WaveSample from among the 15 available modulators. This is in addition to ENV3, which is always routed to volume.

MODAMT Range: 00 to 99

Determines the amount by which the assigned volume modulator will affect the output volume of the WaveSample. Raising this value will lower the unmodulated volume of the WaveSample(s), creating the headroom necessary for the volume modulation. Note that the AMOUNT value is positive-going only. To obtain negative volume modulation, you must use the VOL MODSRC SHAPER (see later in this Section).

Press the **Output** button again. The display shows the second OUTPUT sub-page:



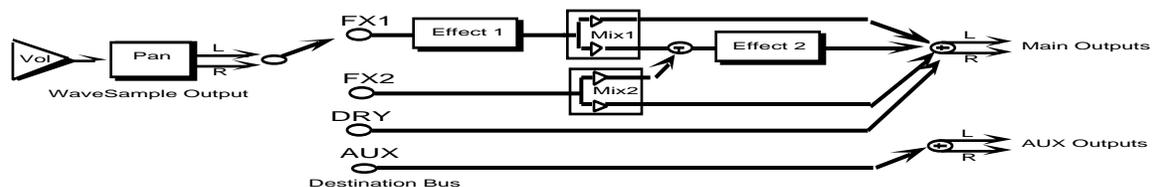
DESTINATION-BUS

Range: FX1, FX2, DRY, or AUX

Each WaveSample within a Sampled Sound can be routed to one of four stereo “busses:”

- FX1, FX2, and DRY feed the main stereo outputs of the TS-12.
- AUX sends the voice directly to the AUX Outputs. Note that voices sent to the AUX Outputs are always dry; that is, they bypass the effects processor.

The diagram below shows a common routing of the signals for each bus. See the sections on “Effects” for more on programming specific effects.



PAN

Range: -99 to +99

Pans the WaveSample within the stereo field. A setting of -99 is panned hard left, and +99 is panned hard right. A value of +00 pans the voice center. The effect of a pan modulator (below) will be added to this.

MODSRC

Range: various

Selects a modulation source for the WaveSample pan from among the 15 available modulators. This will cause the WaveSample's location in the stereo field to vary with the output level of the modulation source.

MODAMT

Range: -99 to +99

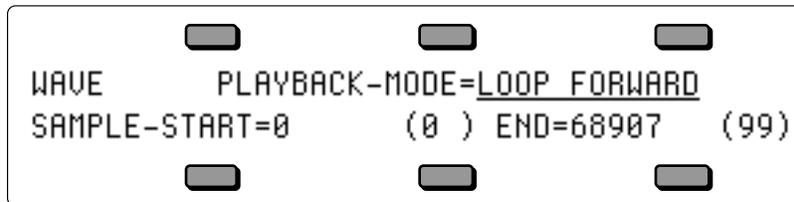
Determines the amount by which the assigned volume modulator will affect the pan of the WaveSample.

Wave Page

The parameters on this page control all the WaveSample pointers such as sample start, sample end, loop points, etc. Also on this page, you can choose the playback mode and set up modulation of the sample start and/or various loop modulation options.

Note: The Wave page parameters can only be edited when the Edit Context page is set up to edit a single WaveSample (WAVESAMPLE=###). The LAYER EDIT NOT ALLOWED message will be displayed if you try to edit those parameters with the Edit Context set up to edit an entire layer or an entire Sampled Sound.

Press the Wave button. The first WAVE sub-page is displayed.



PLAYBACK-MODE

Range: various

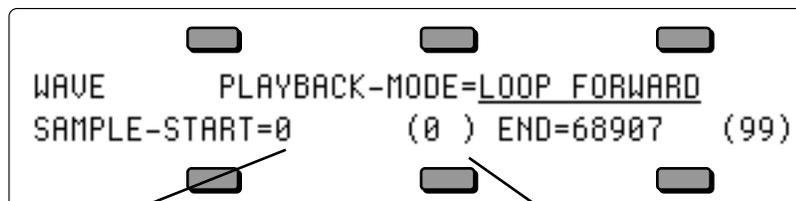
This parameter allows you to select one of five possible WaveSample playback modes.

- FORWARD-NO LOOP — The TS-12 plays through the WaveSample once, from sample start to sample end.
- BACKWARD-NO LOOP — The TS-12 plays through the WaveSample once, only in reverse, from sample end to sample start.
- LOOP FORWARD — The TS-12 will play forward from sample start to loop end and return to loop start and will continue playing the loop while the key is depressed. Once the key is released the loop continues playing as the WaveSample envelopes away.
- LOOP BIDIRECTION — The TS-12 will play forward from sample start. At loop end, the TS-12 will play the WaveSample in reverse to the loop start, playing the loop section back and forth until the key is released.
- LOOP AND RELEASE — The TS-12 will play forward from sample start and will continue playing the loop while the key is depressed. As soon as the key is released the TS-12 will go into release mode from wherever it is and will keep playing until the end of the WaveSample, playing data after the loop. LOOP AND RELEASE works in conjunction with Envelope 3, which needs to have its MODE parameter set to FINISH, and its TIME and LEVEL values adjusted appropriately.

SAMPLE-START

This parameter allows you to set the sample start point.

When the SAMPLE START or SAMPLE END parameters are displayed there are two ways to adjust them — you can move in large steps by adjusting the percent setting, or move one sample at a time by choosing the fine adjust.



Sample Start Number (fine adjust)

Location in percent of entire wavesample (coarse adjust)

The Coarse Adjust reading is the one in parentheses. Changing this value will move the Sample

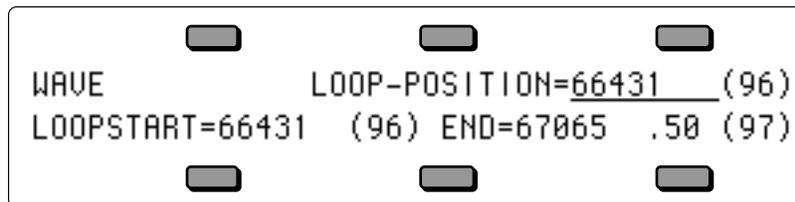
Start in steps of one percent of the entire WaveSample. Use the **Data Entry Slider** or the **Up/Down Arrow** buttons to move the Sample Start ahead until the dead space is gone when you play.

Once you have gotten close using the percent setting, press the **Left Arrow** button to underline the Fine Adjust setting. Now the **Data Entry Slider** or the **Up/Down Arrow** buttons will move the SAMPLE-START in small steps (less than 1%), letting you fine-tune its exact position while playing the WaveSample.

Sample END

Allows you to set the sample end point. Again you see the sample number (Fine Adjust) and the percent (Coarse Adjust). Use the data entry controls to edit this parameter in the same fashion as the SAMPLE-START parameter.

Press the **Wave** button again. The second WAVE sub-page is displayed.



LOOP-POSITION

This parameter displays the LOOP-START but moves both LOOP-START and END, keeping the size of the loop the same. It lets you search for the perfect loop location after you've set up an optimal loop length.

LOOPSTART

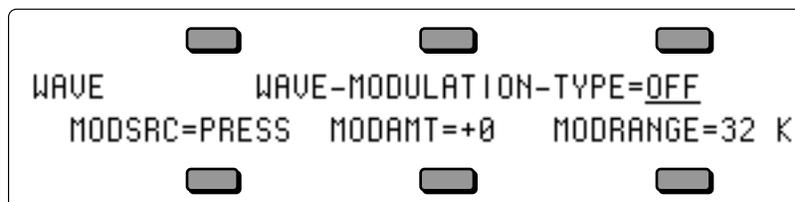
This parameter allows you to set the loop start point. After making a sample it is often necessary to "loop" (play over and over) a portion of the sound, so that it can sustain indefinitely when the key is held down.

Loop END

This parameter allows you to set or change the loop end point.

Note: The maximum loop length is 1.5 MegaWords.

Press the **Wave** button a third time. The final WAVE sub-page is displayed.



WAVE-MODULATION-TYPE

Range: various (see below)

This parameter allows you to modulate certain WAVE page parameters with any of the 15 modulation sources. The WAVE-MODULATION-TYPE parameter specifies which of the WAVE page parameters the modulation will affect. There are seven possible modulation types:

- **OFF** — Wave modulation is disabled.
- **LOOP POS** — Selecting this setting will modulate the LOOP-POSITION of the WaveSample, moving it forward (towards the end of the WaveSample) with positive MODAMT values, and

- backward (toward the beginning of the WaveSample) with negative MODAMT values.
- **START** — The SAMPLE-START will be modulated.
 - **START+LP** — Both the SAMPLE-START and the LOOP-POSITION will be modulated. When START+LP is selected, sample playback will always begin at the LOOPSTART value, rather than at the SAMPLE-START value.
 - **LOOPSTRT** — Modulates the LOOPSTART parameter. This will have the effect of either making the loop shorter (with positive MODAMT values moving the LOOPSTART point closer to the Loop END) or longer (with negative MODAMT values moving the LOOPSTART away from the Loop END).
 - **LOOP END** — Works the same as LOOPSTRT, but from the back end of the WaveSample.
 - **LPSTRT-X** — This setting works the same as LOOPSTRT, but a pitch correction scheme is now employed to keep the pitch constant as the loop gets longer and shorter.
 - **TRANSWAV** — Similar to LOOP POS, but the loop will move in increments of exactly one loop length. For example, with LOOPSTART at 0 and Loop END at 100, a positive MODAMT will cause the loop to jump to LOOPSTART 100, Loop END 200, and then to LOOPSTART 200, Loop END 300, etc. When TRANSWAV is selected, the MODRANGE parameter (see below) has no effect, but the MODAMT (also below) sets the number of “jumps” that will happen over the full range of the modulator's output.

MODSRC Range: various
Selects a modulation source for the wave modulation from among the 15 available modulators.

MODAMT Range: -99 to +99
MODRANGE Range: 1 Sample to 2 MegaSamples

The MODAMT and MODRANGE parameters determine the amount by which the assigned wave modulator will affect the WAVE page parameters:

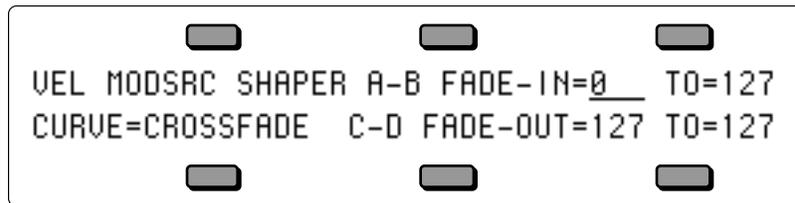
- **MOD AMT** — This parameter determines the amount of modulation that will be applied to the wave parameter specified in the WAVE-MODULATION-TYPE parameter. This parameter has a value range of -99 to +99, allowing both positive and negative modulation amounts.
- **RANGE** — This parameter determines the range that will be covered by the MODAMT. The RANGE is displayed in sample size. The reason for this parameter is due to the nature of Sampled Sounds. Whereas ROM-based synthesizers contain waveforms that have a defined length that will always be the same, the size of each individual WaveSample will vary from Sampled Sound to Sampled Sound. The MOD AMT parameter has no way of knowing this sample size, so the TS-12 uses the RANGE parameter to define it.

To determine what value to set the RANGE parameter to, go to the Sample END parameter and examine at the value. This value tells you how large the selected WaveSample is. You can then select the RANGE value that comes closest to the actual size of the WaveSample.

If you were working with a very small WaveSample, you would adjust the wave modulation amount to something like this MOD AMT=+99 RANGE=128. If you were working with a much larger WaveSample, you would adjust the wave modulation to MOD AMT=+99 RANGE=1 MG (MegaSample). Think of RANGE as a multiplier, and MOD AMT=-99 TO +99 as fine tuning.

Volume Mod Source Shaper Page

Press the **Mod Mixer** button. The VOL MODSRC SHAPER page is displayed.

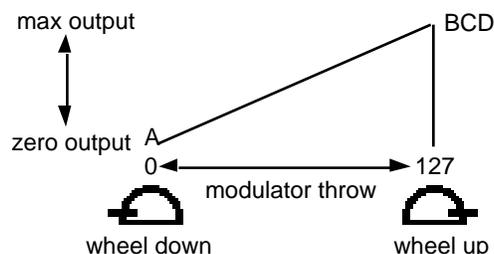


A - B FADE-IN - TO Range: 0 to 127
C - D FADE-OUT - TO Range: 0 to 127

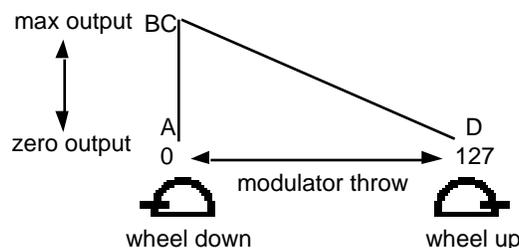
The volume modulator cross fade breakpoints (A and B, C and D) allow you to scale the effect of the volume modulator (selected on the Output page MODSRC parameter) to create keyboard, velocity, or other types of cross fades. Using the cross fade breakpoints, you can customize how the volume modulator will affect the volume of the WaveSample across the range (or throw) of its output. This lets you use velocity, keyboard position, pressure or any other modulator to cross fade between WaveSamples.

Think of the A-B FADE-IN/C-D FADE-OUT parameters as a trapezoid, whose shape will affect the output of the modulator assigned to the Output page MODSRC parameter. The A-B FADE IN value sets the point along the throw of the volume modulator that the modulator's output value will begin to rise above zero (i.e. fade in). The A-B FADE TO value sets the point along the throw of the volume modulator that the modulator's output value will have risen to its maximum output. The C-D FADE OUT value sets the point along the throw of the volume modulator that the modulator's output value will begin to fall from maximum (i.e. fade out). The C-D FADE TO value sets the point along the throw of the volume modulator that the modulator's output value will have fallen to zero.

The default values are "A-B FADE IN=0 TO 127" and "C-D FADE OUT=127 TO 127," imposing the following shape on the output of the volume modulator. In this example the Mod Wheel is the volume modulator:



To reverse the polarity of the volume modulator, set the values as follows: "A-B FADE IN=0 TO 0" and "C-D FADE OUT=0 TO 127." The shape imposed on the output of the volume modulation is as follows; again, the Mod Wheel is the volume modulator:



Note: Whenever you cross fade between WaveSamples, the WaveSamples must be in different layers,

since only one WaveSample can occupy a given key within a single layer.

CURVE

Range: CROSSFADE or LINEAR

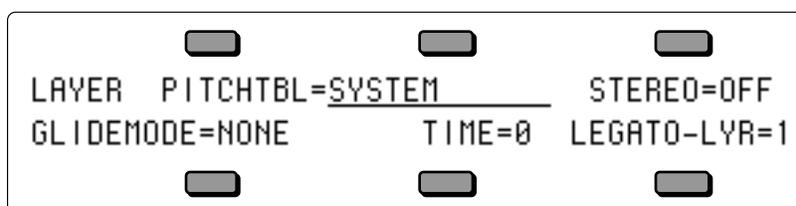
Determines what type of curve will be used when fading samples in and out between breakpoints A-B and C-D. There are two possible fade curves:

- **CROSSFADE** — This convex curve features a steep initial rise/drop off. It is best used when a quick change between breakpoints is desired, as in a keyboard or velocity cross fade.
- **LINEAR** — This linear curve ramps up and down evenly, making it preferable when smoother transitions between breakpoints are appropriate, such as when using pressure to cross fade.

Layer Page

The parameters on this page control the layers within a Sampled Sound.

Press the **Layer (Program Control)** button. The first LAYER sub-page is displayed.

**PITCHTBL**

Range: SYSTEM, NO PITCH, Pitch Tables 1-8.

This parameter determines whether the layer will use the SYSTEM pitch-table, or play each WaveSample in the layer at the pitch it would play on C4 (NO PITCH), or use any pitch-table that was stored with the Sampled Sound.

STEREO

Range: OFF or ON

Stereo samples are stored in pairs of adjacent layers (1&2, 3&4, 5&6, or 7&8), with the LEFT channel always stored in an odd numbered layer (1, 3, 5 or 7), and the RIGHT channel stored across the same key range in the next higher even numbered layer. These paired adjacent layers are called *companion* layers.

When the STEREO parameter is turned ON in the selected LAYER, it is simultaneously turned ON in the companion layer. When STEREO= ON, simultaneous editing of both channels of a Stereo Sample is enabled (see below).

When STEREO= ON, editing layer or WaveSample parameters in one layer will edit the same parameter in the companion layer. Editing with the **Data Entry Slider** will set the current parameter in both layers to the same absolute value. Editing with the **Up/Down Arrow** buttons will edit parameter values in both layers *relative* to one another.

When STEREO= ON, all pitch modulation in the right layer will be slaved to the settings in the WaveSamples assigned to the same or overlapping key zones in the left layer. This includes Pitch BEND Range, NOISE-RATE, and all pitch modulation. Pitch modulation settings for WaveSamples in the right layer will be ignored.

STEREO can be turned OFF to allow independent editing of layers that contain one channel of a stereo sample.

If the companion layer does not exist, STEREO cannot be turned ON in the selected layer. The screen will display NO STEREO COMPANION LAYER.

GLIDEMODE

Range: various (see below)

Enables Glide (portamento) and several forms of monophonic voice assignment in each layer. There are five GLIDE modes available:

For monophonic voice assignment without glide, set GLIDEMODE to LEGATO, TRIGGER, or MINIMODE, and set TIME=0.

- **NONE** — Glide is off. This is normal polyphonic operation, with no portamento.
- **LEGATO** — Enables monophonic voice assignment, allowing only one note of polyphony to be active in the layer. If a key is depressed before another is released (i.e.: if you play legato), the voice will glide from the old note to the new one. If you play a key with no other keys down (i.e.: if you play staccato), the voice will not glide. The envelopes and WaveSamples are retriggered, or restarted, from the beginning each time there is a new key down. This is also the mode to use to enable the legato layer function.
- **PEDAL** — Enables the sustain pedal to start polyphonic glide. In this mode, the glide and polyphony are controlled by the sustain pedal. When the pedal is up, there is no glide and the layer is fully polyphonic. When the sustain pedal is depressed, the glide is enabled, and the polyphony is limited to the number of notes being sounded at the moment. For example, with the pedal up play a three-note chord. Press the sustain pedal and lift your fingers off the keys (the three notes will sustain). Now press another key: one of these sustaining notes will be stolen and will glide to the new note. The envelopes and WaveSamples are retriggered, or restarted, each time there is a new key down. Holding a key down will prevent the note from being stolen. This allows controlled voice leading.
- **TRIGGER** — This mode plays monophonically, with the envelopes and WaveSamples retriggering, or restarting, each time there is a new key down. This mode works just like LEGATO mode, except that it has no “note memory”. It is ideal for adding monophonic piano “thuds” to piano sounds.
- **MINIMODE** — This mode plays with one-voice polyphony, and new notes will glide from the previous note if the previous note is still held. Unlike the LEGATO, PEDAL, or TRIGGER modes, the envelopes and WaveSamples are only restarted from the beginning when you play a key with no other keys down (i.e.: if you play staccato).

Note: LEGATO and MINIMODE feature “note memory.” If you release a key while still holding down another key, the pitch will glide back to the note you are holding. Holding down the sustain pedal will dynamically disable note memory.

GLIDE MODES

Mode	Staccato Glide	Legato Glide	Legato Envelope Retrigger	Note Memory
LEGATO	NO	YES	YES	YES
PEDAL (with pedal down)	YES	YES	YES	NO
TRIGGER	NO	YES	YES	NO
MINIMODE	NO	YES	NO	YES

TIME

Range: 0 to 99

This parameter controls the time it takes for the pitch to slide smoothly (glide) from one note to another. The higher the value, the longer the glide time. The TS-12 uses *Constant-Time Portamento*. This means that it will take the same amount of time to glide between notes that are close together (i.e. C4 to D4) as it will to glide between notes that are far apart (i.e. C4 to C7).

LEGATO-LYR

Range: layers 1 to 8

The legato layer is an ENSONIQ innovation that enables the TS-12 to capture the elusive nuances of acoustic Sampled Sounds. The sound of a wind Sampled Sound, the flute for example, is different when it is “tongued” than when notes are played in a connected manner (called legato). When two notes are “slurred” or “trilled” the characteristic attack of the second note is not present. The TS-12 allows a simulation of this effect when used with one of the glide modes.

The rules for glide, described above, determine when one note will glide to another. The glide time determines how fast it will glide to the new note. The LEGATO-LYR parameter selects which layer, and therefore which WaveSample(s), will play on the new note.

For example, suppose that layer 1 is a flute sample with a tongued attack, and layer 2 is a flute sustain without any attack. To use this function:

On the Edit page (press the **Select Voice** button):

- Enable both layer 1 and layer 2 in the current patch.
The display reads: 00 LAYERS-IN-PATCH=1 2 - - - - -.

On the Edit KEY-DOWN/KEY-UP LAYERS page (press the **Copy** button):

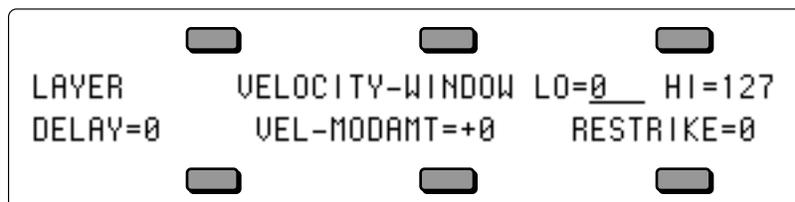
- Enable layer 1, the attack, as a keydown layer. Disable layer two as a keydown layer. The display reads: KEY-DOWN-LAYERS=1 - - - - -.

On the Layer page for layer 1 (press the **Program Control** button):

- Set GLIDEMODE=LEGATO.
- Set LEGATO-LYR=2.
- Adjust Glide TIME as you see fit.

If a key is depressed before another is released, the new note will play the WaveSample in the LEGATO-LYR (layer 2).

Press the **Layer (Program Control)** button. The second LAYER sub-page is displayed.

**VELOCITY-WINDOW LO & HI**

Ranges: 000 to 127

The LO and HI parameters allow you to define the velocity range for each layer. The full velocity range (default) is LO=000 HI=127. By adjusting these parameters, you can set specific velocity ranges for each layer. This allows velocity switching between different layers within the Sampled Sound. For example, if you set a solo violin voice to LO=000 HI=064, and a string section voice to LO=064 HI=127, a soft velocity will play only the solo violin, whereas a harder velocity will play only the string section. Ranges can over-lap for velocity cross-fade effects.

DELAY

Range: 0 to 5000 msec

This parameter determines how long WaveSamples within the selected layer will wait after a key is struck before playing. A delay of up to 5 seconds is possible.

VEL-MODAMT

Range: -99 to +99

This parameter determines the amount by which velocity will affect the layer DELAY time. Positive VEL-MODAMT values will cause harder velocities to increase the DELAY time. Negative VEL-MODAMT values will cause harder velocities to decrease the DELAY time. Setting the DELAY to zero will disable velocity modulation of layer DELAY time.

RESTRIKE

Range: 0 to 99

This parameter controls the layer Restrike time. When you play a particular note and then restrike it again immediately before the old note has finished sounding, the amount of time it takes for the first note to fadeout is determined by this parameter. By varying the setting of this parameter, you can control how long sounds overlap when a note is restruck.

For example, if you have a slow string sound, it may sound more natural to use a longer RESTRIKE value, which will cause the old note to decay more slowly, rather than end abruptly when the new note starts. Normal values are around 10. The higher the value, the longer the fadeout time.

Sampled Sound Effects Page (Program Effects button)

Understanding the effect algorithms and their related parameters are described in detail in *Section 6 — Understanding Effects* and *Section 7 — Effect Parameters*.

Appendix

TS-12 MIDI Implementation

The TS-12 features an extensive MIDI (Musical Instrument Digital Interface) implementation. For normal applications, you will find all the information you need regarding the TS-12's MIDI functions in this manual. You can also refer to the MIDI Implementation Chart on the next page for a summary of the TS-12 MIDI implementation.

If you are writing a computer program to communicate with the TS-12 via MIDI, or otherwise require a copy of the full TS-12 System Exclusive Specification, it is available free of charge by writing to:

ENSONIQ Corp.
MIDI Specification Desk
155 Great Valley Parkway
P.O. Box 3035
Malvern PA 19355-0735
USA

Include in your written request your name and address, and indicate that you would like a copy of the "TS-12 System Exclusive Specification." Please allow 2 to 3 weeks for delivery.

Registered Parameters

Registered parameters are transmitted (as four sequential continuous controller messages) by the TS-12 whenever certain parameters are edited from the front panel. The two registered parameter controllers select the parameter and the following two data entry controllers specify the value.

Controllers

Number	Name	Value
100	Registered Parameter Select LSB	00 or 01
101	Registered Parameter Select MSB	always 0
6	Data Entry MSB (Most Significant Byte)	(see below)
38	Data Entry LSB (Least Significant Byte)	(see below)

Registered Parameters

Number	Name	TS-12 parameter range
00	Pitch Bend Range	0..12..0H..12H
01	Fine Tuning	0..255 (displayed -99 to +99)
02	Coarse Tuning (GM Mode only)	0..127 (displayed -64 to +63)

The parameter values are sent as two Data Entry controller messages:

Parameter	Data Entry MSB (6)	Data Entry LSB (38)
Pitch Bend Range	0..25	0
Fine Tuning	0..127 (internal bits 1..7)	64 or 0 (internal bit 0)

For Fine Tuning, which is an 8-bit value internally, the most significant 7 bits are offset by 64 and shifted once before being sent as Data Entry MSB (Controller 6). The least significant bit of the internal value is transmitted as bit 6 of Data Entry LSB (Controller 38).

In most system modes, registered parameters 0 and 1 affect the System page TUNE and BEND parameters respectively (when received on the Base Channel only). In General MIDI mode, registered parameters 0, 1, and 2 are received multi-timbrally, and affect each Track/Channel independently.

MODEL: TS-12

MIDI Implementation Chart

Version: 2.0

Function...	Transmitted	Recognized	Remarks
Basic Channel Default Channels	1 1-16	1 1-16	
Mode Default Messages Altered	1 X X	1, 3, 4, MULTI X X	current mode is memorized Global Controllers in MONO Mode
Note Number True Voice	21-108	21-108	
Velocity Note ON Note OFF	O O	O X ¹	¹ The TS-12 voice architecture does not support Release Velocity
After Touch Key Channel	X O	O O	
Pitch Bender	O	O	
Control Change	1-127 External Controller 0 Bank Select MSB 1 Mod Wheel 4 Foot Pedal 6 Data Entry MSB ² 7 Volume 10 Pan 12 Effect Mod Foot Switch 32 Bank Select LSB 38 Data Entry LSB ² 64 Sustain 66 Sostenuto 70 Sound Variation ³ 71 Harmonic Content ⁴ 72 Release Time 73 Attack Time 74 Brightness 75 Rate (LFO &/or Duration) 100 Reg. Param. Select LSB ⁵ 101 Reg. Param. Select MSB ⁶	1-127 External Controller 0 Bank Select MSB 1 Mod Wheel 4 Foot Pedal 6 Data Entry MSB ² 7 Volume 10 Pan 12 Effect Mod Foot Switch 32 Bank Select LSB 38 Data Entry LSB ² 64 Sustain 66 Sostenuto 70 Sound Variation ³ 71 Harmonic Content ⁴ 72 Release Time 73 Attack Time 74 Brightness 75 Rate (LFO &/or Duration) 100 Reg. Param. Select LSB ⁵ 101 Reg. Param. Select MSB ⁶	assignable (XCTRL) ² for Reg. Params only after 100 & 101 are transmitted or received. ³ Patch Selects; values of 0, 32, 64, 127 ⁴ Timbre ⁵ values of 0 & 1 only ⁶ always 0
Program Change True Number	0-127 0-127	0-119 0-119	in OMNI, POLY, & MONO A in MULTI & MONO B
System Exclusive	O	O	see TS-12 Sys-Ex Spec.
System Common : Song Pos : Song Sel : Tune	O O X	O O X	
System Real Time : Clocks : Commands	O O ⁷	O O ⁷	⁷ Start, Stop, Continue
Aux. Messages : Local On/Off : All Notes Off : Active Sense : Reset	X O X O	X O X O	
Notes			

Mode 1= OMNI ON, POLY
Mode 3= OMNI OFF, POLY

Mode 2= OMNI ON, MONO
Mode 4= OMNI OFF, MONO

O = YES
X = NO

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